JUN 9 1913

Telephony.

THE AMERICAN TELEPHONE JOURNAL

Comprising Telephony, American Telephone Journal, Telephone Weekly, Telephone Magazine, Telephone Securities, The Telephone and Sound Waves
PUBLISHED WEEKLY BY THE TELEPHONY PUBLISHING COMPANY, MONADNOCK BLOCK, CHICAGO

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INDEX TO ADVERTISEMENTS, PAGE 65
BUYERS REFERENCE INDEX PAGE 65

CHICAGO, JUNE 7, 1913

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"The 20th Century Telephone"

WHY?

Because it meets the requirements of the age

The World today demands efficient service;
The AUTOMATIC gives the most efficient service possible.

The public insists upon low rates for public utilities;
The AUTOMATIC is the most economical system to operate.

Modern invention is constantly striving to eliminate the "Human Factor;"
The AUTOMATIC needs no switchboard operator; there is no "Human Factor."

Why not line up with the 20th Century tendencies?

The AUTOMATIC is one of them

Automatic Electric Company
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No. 133

When You Equip Your Exchange With

McCloud Operator Chairs

you have done all that is possible for the comfort of your operators.

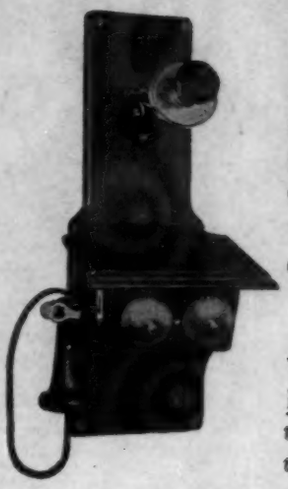
The operators are under a continual strain and every effort should be made to add to their comfort—it improves their health and your service.

McCloud chairs fit the back, are adjustable and universally accepted as standard.

For specifications—finish of wood, dimensions and price, get our catalog.

The Davis Chair Co.

Marysville, Ohio



ANDRAE

Central Energy Type Magneto Telephones

Will give you absolutely Perfect Service—and trouble-free service—for the longest time.

We fully guarantee every instrument to be perfect in every respect and to remain perfect for a period of at least five years. Why not install ANDRAE apparatus and have quality service and perfect protection?

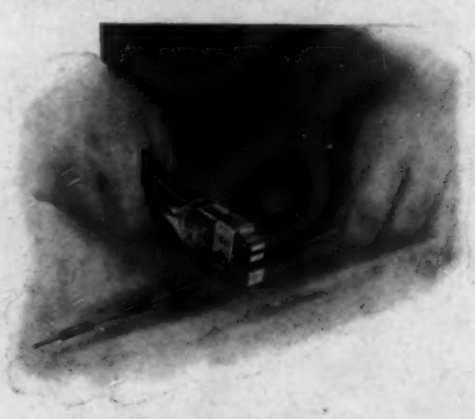
Write Us Today for Our 300-Page Telephone Catalog No. 34.

Julius Andrae & Sons Co.

Established since 1860

120 Michigan St. Milwaukee, Wis.

ONE SQUEEZE AND A PINCH



lays the wire bare

No trouble—No wasted time—and a cleaner, neater stripping job—10 times quicker than the jack-knife method—by using

GOODRICH WIRE-SKINNING PLIERS

The jaws of the plier are made up of knives for cutting the insulation—a splitting knife, a knife for scraping the wire—slots for bending loops in wire ends—jaws for pulling off the insulation and a pair of side cutting jaws—and they all work together at one squeeze of the handle.

Can you afford to waste time the old way? Get Klein's pocket catalog of tools—every telephone man should have one.

Mathias Klein & Sons, Station U34 CHICAGO, ILL.

YAGER'S

Soldering Fluxes

4 Forms PASTE—STICK SALTS—LIQUID

We will send you a free sample to show you what real solder satisfaction is.

Yager's fluxes not only clean the surface—but prevent oxidation under the heat of the iron, and pull solder close to the surface leaving no film to keep it away.

Ask for your sample today—

Alex R. Benson Co.

Hudson, N. Y.

C. O. BAKER, President C. W. BAKER, Vice-Pres.

PLATINUM

Foil, Sheets, Wire, Rivets and Contacts

Anything Made According to Specifications

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Baker & Company, Inc.

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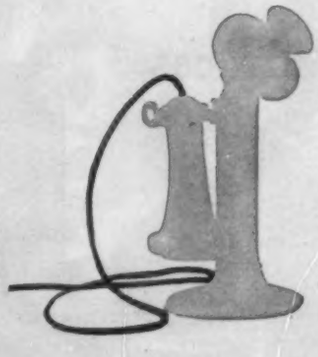
To meet adequately the most severe operating conditions

Belden Telephone Cords

are specially made. We make a cord or wire for every particular purpose—for each industry requiring individual wire or cords. Our operating facilities enable us to turn out a superior product at a very low price. It will pay you to investigate—*free samples sent on request.*

BELDEN MFG. CO.

2302 South Western Avenue, CHICAGO



Runzel-Lenz
Electric Manufacturing Company
1751-1753 N. Western Ave.
Chicago, Ill.

The satisfaction that comes of confidence in one's service—in knowing that nothing has been left undone that could better or strengthen that service is compensation enough for the labor of its attainment—although the material profit naturally follows.

Runzel-Lenz Cords give that sort of satisfaction.

You owe it to your service to try them. Samples free upon request.

Please tell the Advertiser you saw his Announcement in TELEPHONY.

"American" Apparatus Always Makes Good

No. 360 Samson Magneto Telephone

We have compressed all the goodness of long experience and constant effort into an instrument your knowledge tells you is best.

Thousands of these phones giving money-making service in hundreds of exchanges prove you should use them.

Note absence of wiring inside of cabinet. No wiring on back either

The generator, switchhook, induction coil and the receiver binding posts are all mounted on one shelf! Hence the wiring is needed only on this shelf. It couldn't be made any simpler or more workmanlike, and this shelf is removable! A most effective way to build a telephone. The switchhook lever is removable! No wires to disconnect from any piece of apparatus to get at another piece! Any one piece is entirely removable without disturbing the wiring leading or connecting to any other piece!

Features of Accessibility

To get at any of the parts of this telephone—the lightning arrester, ringer, transmitter and receiver are accessible, and the generator, switchhook, induction coil and receiver binding posts are all on one *removable* shelf, thus instantly accessible. To remove this shelf and bring all of these parts out for inspection, remove the switchhook lever, unscrew two large screws, and the shelf slides right out.

Lightning Arresters with Double Carbon Surfaces

Self cleaning. Two long parallel carbon cylinders. One metallic ground plate covers but does not touch the carbons. Easily removed. Good insulation prevent carbons from touching the ground plate.

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Write for prices to our Special Distributors or direct to us

Wherever you are, there is a nearby stock for you.

Wherever you have been buying, for your own good, write to nearest depot.

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STATE AND 64th STREETS, (Englewood Station) CHICAGO, ILL

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INTER-COMM-PHONE

Press one button once!

The simplest and most efficient intercommunicating private telephone system. Durable in construction and ahead of the times in design.

Let us send you details

Stromberg-Carlson Telephone Mfg. Co.
Rochester, New York, U. S. A.
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Code No. 905
6-Station
Desk Set
Other Sizes—Several Styles
12-22-32
Station Capacities

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SEBCO Expansion Bolts

Their importance is appreciated more each day by those who use them

THERE *never* was a *good* reason for the use of wooden plugs for fastening equipment to walls, ceilings, etc. Their use had been tolerated because the average mechanic knew of nothing better for this purpose.

Since the invention of **Sebco Screw Anchors** and **Expansion Bolts,** the old wooden plug is unnecessary. The tendency of equipment pulling away from the objects to which they are fastened was eliminated when Sebco Screw Anchors and Expansion Bolts were first placed on the market. Today, they are used wherever permanency of fastening is desired, from the Woolworth Building in New York to the lonely signal shack in the back-woods.

Sebco Screw Anchors are made of a non-rusting composition metal which is soft enough to allow the ordinary machine screw to cut its own thread when being tightened. *Can neither rust nor rot.*

Sebco Expansion Bolts are made of malleable iron. They are the only safe way of fastening heavy equipment such as large Motors, Switchboards, Cable Insulators, etc., in place

Star Expansion Bolt Co.

147-149 Cedar Street
NEW YORK CITY

Western Electric Company

Manufacturers of the 7,000,000 "Bell" Telephones

New York	Atlanta	Chicago	Kansas City	San Francisco	Montreal	London
Boston	Savannah	Milwaukee	Oklahoma City	Oakland	Toronto	Antwerp
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EQUIPMENT FOR EVERY ELECTRICAL NEED

Stromberg-Carlson Quality Condensers

The Best Condenser

All QUALITY CONDENSERS are made by our improved process, using two layers of selected high grade tinfoil interleaved between four layers of durable pure rice paper. Our method of selecting, inspecting and handling tinfoil and paper is such as to absolutely assure only the best materials being put into a Stromberg - Carlson QUALITY CONDENSER. Our condenser manufacturing is done in a properly and well arranged department espe.ially equipped to produce a flawless product. These well made QUALITY CONDENSERS are scientifically machine wound and guaranteed to be uniform and accurate to the electro static capacity rating as marked and dated. The insulation resistance between plates is guaranteed to be 40 Megohms per micro farad. The bare QUALITY CONDENSER is impregnated thoroughly in pure paraffine at the proper temperature and compressed by great force to remove all traces of air and moisture from the wound condenser.

Put up in metal containers with terminals as required. Our exceptional facilities can handle large orders, but all standard QUALITY CONDENSERS are carried in stock for immediate shipment. We make QUALITY CONDENSERS with or without metal containers of any capacity or form to meet purchaser's exact requirements. Our long experience is back of the product.

Send Now For Samples and Prices

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STURDIEST, STRONGEST, EASIEST TO INSTALL, NO SPECIAL TOOLS, JUST A SLEDGE AND A MAN TO SWING IT.
HOLDS TIGHT WHEREVER ANY AND WHERE NO OTHER PATENT ANCHOR CAN BE INSTALLED.

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CROUSE-HINDS COMPANY

SYRACUSE, N. Y., U. S. A.

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30 CHURCH ST.	201 DEVONSHIRE ST.	18 E. FOURTH AVE.	417 S. DEARBORN ST.

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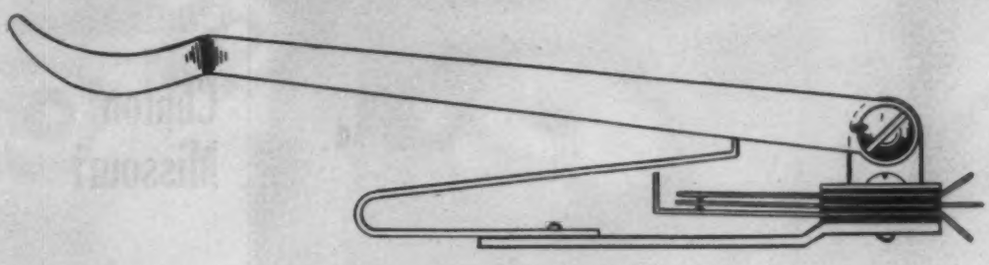
MANUFACTURERS who have supplied the Trade with infringing Equipment of the character illustrated below, are warned to protect themselves by procuring a license for continued manufacture and to make an accounting of past production. You owe this to your customers.



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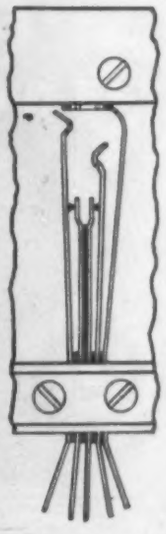

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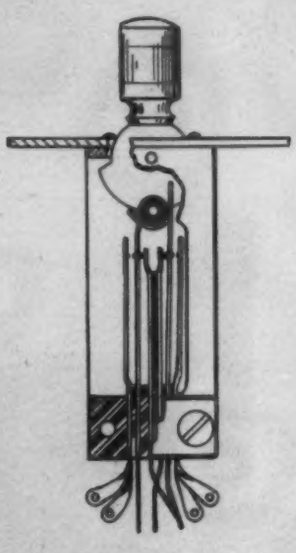

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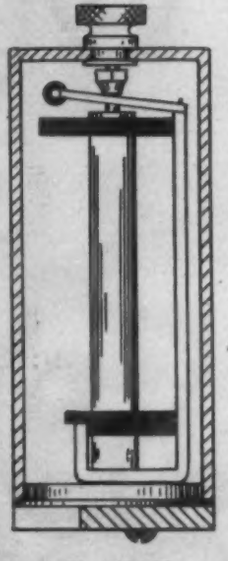
Filed Sept. 14, 1901



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THE NORTH ELECTRIC COMPANY

CHICAGO, ILL.
1343-52 Monadnock Block

CLEVELAND, OHIO
917 American Trust Building

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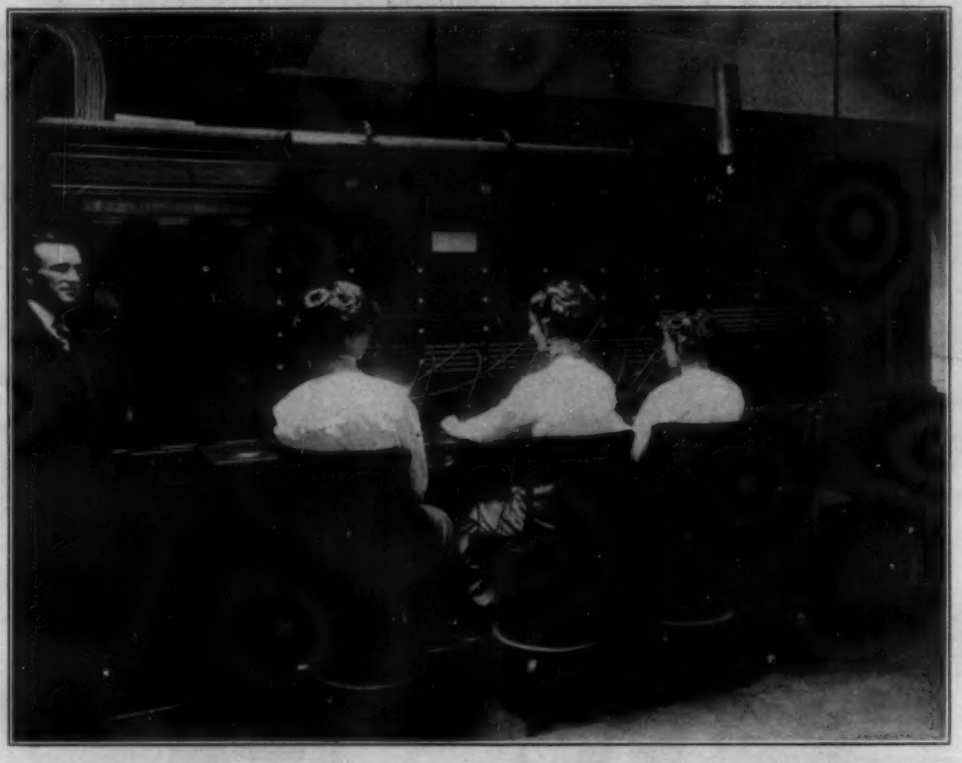
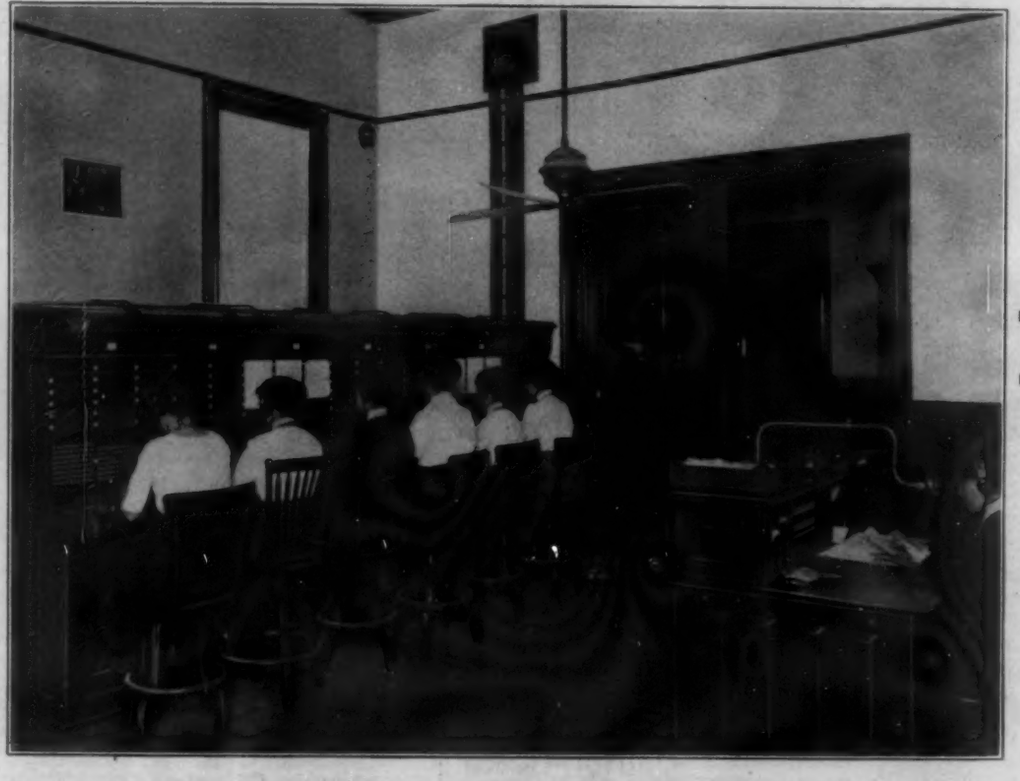
FOUR INTERESTING KELLOGG EQUIPMENTS EMPHASIZING TRAFFIC EFFICIENCY IN THEIR OPERATION



Clinton Missouri



Temple Texas

RECENTLY INSTALLED EXCHANGES ILLUSTRATING LOW MAINTENANCE AND EFFECTIVE TELEPHONE HANDLING

McKinney Texas

Jefferson Missouri

KELLOGG SWITCHBOARD & SUPPLY CO.

CHICAGO, ILLINOIS

KANSAS CITY, MO. SAN FRANCISCO, CAL.

CANADIAN SALES OFFICES:

REGINA, Deering Electric Co., Ltd. WINNIPEG, Houston & Co., Ltd. VANCOUVER, B. C., Hoist & Co.

Georgia's Gain

"What is one man's gain is another man's loss"—sometimes. When Georgia gained an agency for ERICSSON TELEPHONES, however, there was not much chance for anyone to lose, except manufacturers of old, out-of-date wood telephones.

The Baltimore Electric Supply Co.

620 W. Peachtree St., Atlanta, Ga.

Now carry a full supply of

Ericsson Telephone Apparatus

in ready stock so that you can get supplies and telephones in one shipment at a moment's notice.

Standard Type all Steel Telephones

No. 315	Series	3 bar	300 ohm
No. 315-K	Bridging	3 bar	300 ohm
No. 315-L	Bridging	3 bar	1000 ohm
No. 316	Bridging	4 bar	1000 ohm
No. 317	Bridging	4 bar	1600 ohm
No. 318	Bridging	5 bar	1600 ohm
No. 319	Bridging	5 bar	2000 ohm
No. 319½	Bridging	5 bar	2500 ohm

315 to 319½

Ericsson Headquarters in Georgia

Write for Catalogue illustrating these and other types and full description

Ericsson Manufacturing Co.

1102 Military Road, Buffalo, N. Y.

OTHER BRANCHES AT

600 Preston Ave., Houston, Texas.
706 Paulsen Bldg., Spokane, Wash.
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214 So. Second St., Cedar Rapids, Iowa.
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513 W. Jackson Ave., Knoxville, Tenn.
547 First St., Edmonton, Alta, Can.
28 Market Ave. S.W., Grand Rapids, Mich.
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310 Terminal Place, Pittsburgh, Pa.
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22 N. 6th St., Minneapolis, Minn.
53 East Broadway, Butte, Mont.
136 So. 10th St., Lincoln, Neb.
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1233 So. Olive St., Los Angeles, Cal.
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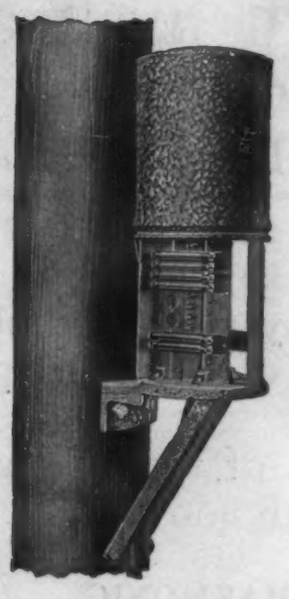
COOK

COOK CABLE TERMINALS

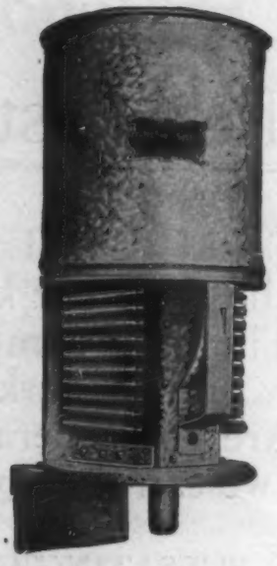
TERMINALS PROTECTORS



TYPE S-18

NO POTHEAD NECESSARY

New and improved protected porcelain terminal of the self contained pothead type. Cable box is of one piece of porcelain with all surfaces thoroughly glazed, insuring best possible insulation together with its fireproof and lasting qualities. Galvanized cover is held under spring tension in either raised or lowered position affording easy access to all connections and making terminal weatherproof.



TYPE S-6

NO POTHEAD NECESSARY

Box is open full length on front side allowing easy access to cable which enters through a self soldering nozzle in the base of the terminal. Cable wires when formed are led through hollow rivets to outside of box where they are soldered doing away with necessity of opening box to inspect connection. Galvanized steel cover makes terminal weatherproof.

H-29 Unit Protector Mountings

are used on both Types S-6 and S-18. New and novel in design, strongly built and durable. Attached to terminals by means of spring contacts that are reliable and positive doing away with bolts, screws, nuts and all loose parts.

For more information consult Cook's catalog—Copy sent on request

Frank B. Cook.

326 West Madison Street

Chicago

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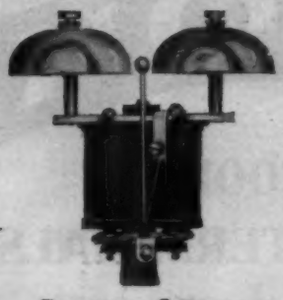
Manny-Meyers Co.,
Seattle, Wash.

Southwestern Representative:
Tel-Electric Co.,
Houston, Texas

CHICAGO

STRAIGHT BRIDGING RINGER



PULSATING CURRENT BIASED RINGER

PULSATING CURRENT HARMONIC RINGER

FOUR FREQUENCY HARMONIC RINGER

The Most Complete Line

CRACRAFT LEICH ringers are in actual service on all the different kinds of systems commercially operated.

The most complete line of selective signaling apparatus now on the market.

Are you operating one of the following systems? If so, we can supply you with additional equipment.

PULSATING CURRENT HARMONIC.
(Two frequency 4 party metallic)

Harmonic (4 frequency 16-33-50-66 Cycle)

Synchromonic (5 frequency 16-30-42-54-66 Cycle)

Two Frequency (20-60 Cycle 4 party divided circuit)

POSITIVE AND NEGATIVE (Biased ringer)

POSITIVE AND NEGATIVE DIRECT CURRENT

Telephones and Automaphones furnished completely equipped with ringers for any of the above systems, all guaranteed to give the best of service obtainable.

Also a complete line of converters, pole changers, ringing-machines, master keys and other central station accessories.

We are sole manufacturers of North Electric Manual Apparatus, Common Battery and Magneto.

Cracraft Leich Electric Co.

Genoa, Ill., U. S. A.

THE DEAN ELECTRIC CO.

LOOK FOR "DEAN" WHERE "QUALITYS" SEEN.

Steel Wall Telephones
(CONVERTIBLE)

This line of telephones comprises unbreakable all-steel elements of convertible design for: A Residence Wall Set; a Business Wall Set; and a Desk Set

For Common Battery Service only.

This wall telephone is made up from exactly the same apparatus parts utilized in our celebrated COSMOS desk stand, thereby giving the utmost mechanical strength as well as neatness of design.

The hinged front of the box and the transmitter support is from one piece of drawn steel, with no joints to become loose in service and cause trouble.

The hook switch lever is removable for convenience in packing and shipping.

All signaling circuit equipment is attached to the base, thus the substituting of a plain cover makes a compact Desk Set Box or Extension Bell.

The Business Type Wall Telephone is made up from a Residence Set and a COSMOS BACKBOARD with Writing Shelf.

When these two elements are assembled the result is a perfectly balanced design of very neat and attractive appearance. There is nothing to break, mar or get out of order.

The Backboards are furnished separate and knocked down with Shelf removed. The latter is provided with two lugs which hook into the backboard, and two machine screw fastenings at the bottom of the brackets make the shelf secure.

Equipped with Movable Transmitter Arm, and wired for either Direct Current or Balanced Bridge Coil Circuit.

KANSAS CITY MISSOURI

MAIN OFFICE & FACTORY
ELYRIA OHIO.

SAN FRANCISCO CALIFORNIA

Built for Service
and
Low Maintenance Cost

Century No. 90 Desk Set

¶ The most artistic, convenient and efficient desk instrument ever produced.

¶ Wired for either Common Battery or Magneto Systems.

¶ Send in your order today. Prompt shipment guaranteed.

CENTURY TELEPHONE CONSTRUCTION CO.
Buffalo, N. Y. *Bridgeburg, Ont.*

Please tell the Advertiser you saw his Announcement in TELEPHONY.

The Way They Grip Shows Why They're It

Matthews Cable Hangers

Are the only hangers made that fit the following specifications:

"Must have separate grip on the messenger and on the cable, i. e., the locking of the clip either on the messenger or on the cable must be independent of the other. No ends to be cut off after installation. No short kinks or ears in the design. The clip to have a life as long as pure zinc will have. Each clip to be able to stand a dead weight of at least 100 pounds when installed. So designed that when installed the distance between the cable and the messenger will not exceed one inch and a half. It must be sightly to the eye. It must not cost more installed than other devices for hanging cable. It must be easy and quick to install. It must require no tools for its installation."

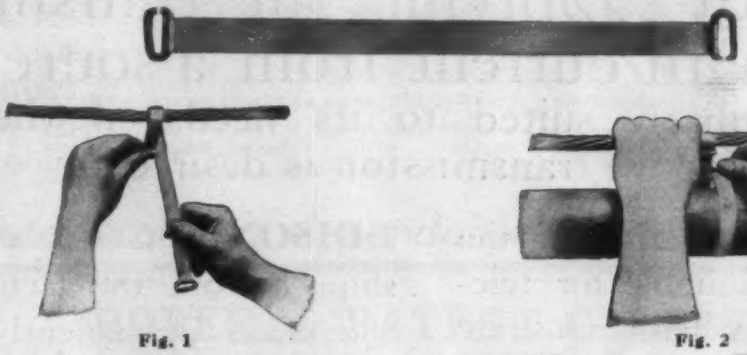


Fig. 1

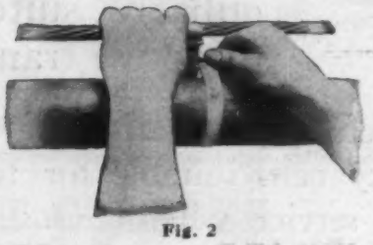


Fig. 2

When you use a cable hanger that requires a tool to attach it to the messenger, you are saving a dollar and wasting two dollars.

Matthews Cable Hangers can be installed faster than any other type of cable hanger and it cannot be installed with a tool.

When a tool is used to install a hanger on the messenger even the most careful workman will frequently scar the galvanizing on the messenger wires. These scarred places soon begin to rust and then your messenger rapidly deteriorates so that it has to be replaced before it has earned as much as it should for you.

You can prevent all of this by using Matthews Cable Hangers, which are put on without tools and grip the messenger and cable separately.

WRITE FOR YOUR FREE SAMPLE

3718 Forest Park Boulevard

DISTRIBUTORS FOR CANADA:

THE NORTHERN ELECTRIC & MANUFACTURING COMPANY, LIMITED

Montreal Halifax Toronto Winnipeg Regina Calgary Edmonton Vancouver

Please tell the Advertiser you saw his Announcement in TELEPHONY.

EDISON BSCO PRIMARY BATTERY

The Standard Closed Circuit Cell

Edison BSCO Type 404 cell — 400 ampere hours capacity.

Telephone authorities lay particular stress on the necessity for supplying the transmitter with current from a source peculiarly suited to its needs, if the most effective transmission is desired.

A careful investigation of the primary cells suitable for telephone service will demonstrate the superiority of the **EDISON** BSCO in every essential feature for bringing out distinct transmission, such as uniform voltage, low internal resistance, and possessing the economic and convenient features of long life and freedom from local action.

EDISON BSCO renewals are shipped from the factory with the plates permanently assembled; this makes the test of recharging convenient and simple, no parts that have been in solution being handled.

Complete Edison BSCO Renewal. Each Edison BSCO complete Renewal consists of Zinc Oxide assembled, can Caustic Soda, and bottle of Oil.

CATALOG AND VOLTAGE CURVES ON REQUEST

The Cheapest Form of Battery Energy

THOMAS A. EDISON, Inc., 272 Lakeside Ave., Orange N. J.

You've always wanted reliable anchorage
—and now you can have it

Give the responsibility of maintaining a sound pole line to the OSHKOSH Anchor.

The OSHKOSH Anchor *offers the greatest holding power of any anchor on the market.* Has 50 per cent greater expansion in virgin earth; the convex top surface of its blades affect a wider range of soil than blades of other shapes; it has four blades instead of two.

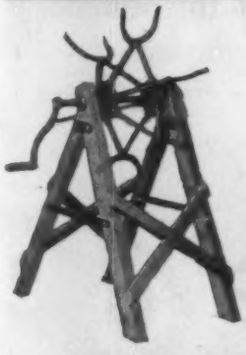
Cannot be carelessly set. Depends on the strain of the guy wire to expand. The greater the strain on the guy the greater the resistance of the anchor. Requires only one man to set—no extra tools.

TABLE OF COMPARISON
between expanded areas of OSHKOSH Anchors with other makes.

	4 in. size	6 in. size	8 in. size
Oshkosh Expanded	11 in.	16½ in.	22 in. in 4 ways
Other Makes Expanded	——	11 in.	15 in. in 2 ways only

The OSHKOSH anchor *costs no more* than less efficient anchors. Its principle and construction are right. The makers of the famous OSHKOSH pole line specialties are back of it and guarantee it fully.

Take advantage of this dependable anchor—Write for price



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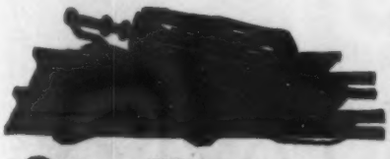

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Telephony.

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Lighting and the Rural Telephone.

When telephone sets were first installed, no provision was made for protection of the instrument and user from danger due to lightning discharges. When it was found that there was danger to the telephone users and also that parts of instruments were in many cases burned out, due to lightning hitting the lines, many schemes were suggested and tried out. The schemes were worked out along two lines; that of entirely disconnecting the telephone set from the line during a storm; and the other of providing a side path, of low resistance, to the ground. The first named plan, while effective, was not satisfactory as after disconnecting a set, it frequently happened that it was not cut in after the storm. Then the arrangements used were such that poor contacts were often made with resulting bad effects upon the service.

The provision of a side path to ground proved the most satisfactory all around method of lightning protection. Many improvements have been made so that now there are a number of arresters of this type which give excellent results. The standard practice in placing the arrester is to locate it as near as possible to the point where the telephone wires enter the building. In many cases the protector can be placed outside, thus preventing the lightning discharge from entering the building. On rural lines where there is no possibility of contact with other wires carrying dangerous current, the lightning arrester is considered sufficient protection for the set and user.

The Telephone and Central Power Stations.

Central power stations as their size increased discovered that the telephone was a most convenient and reliable aid in the operation of their systems, especially in cases where one or more power plants were operated in connection with substations. In these cases it was found absolutely essential for the best interest of service to vest the operating responsibility and authority in one party. This necessitates that the operating authority be provided with means for instant communication with the many divisions of the system.

The provision of adequate private telephone systems was the result to this demand. Systems used exclusively for the transmission or orders relating to the operation of the power system were installed and now practically every large central station company has its own private system. In addition to these systems there are also intercommunicating systems which provide facilities for communication between the various departments.

The many uses which power companies and central stations make of the telephone together with a brief description of some installations are given in a paper, presented by Angus S. Hibbard, at the annual convention of the National Electric Light Association which was held in Chicago this week. The paper is published on other pages of this issue.

Enthusing the Operating Force.

Putting enthusiasm into an operating force is one of the means for promoting the "Service First" idea. An enthusiastic force will certainly give better service than one which is only doing the work in a machine-like manner, for the pay which may be obtained. The efficiency of a force in this condition is low and the employer gets only a percentage of each member's full working ability, although paying for all of it.

A company may have an excellent system and methods of doing business but the best results are not obtained unless the individual operator is interested and is putting her whole heart into the work. The problem of arousing such enthusiasm and love of work in an operating force is one which has been studied by many, and from various angles. Those companies which have been most successful along this line have as executives persons who are filled with enthusiasm themselves and in addition have the ability to transmit and radiate it to those with whom they come in contact.

They seem to know instinctively how to handle the individual members of the force; ability to analyze character is natural with them. Then, knowing the temperaments, the personal interest of the operators are aroused and individual effort stimulated. Probably the best means for doing this is by means of personal talks which are also supplemented, in the case of large exchanges, by bulletins, lively, timely, and directly to the point.

A Fair Man

By Herbert Kaufman

He gazes at life through a window pane, and does not view it through a lens. Therefore, he sees all things clearly, since he does not permit prejudice to distort his vision.

He continually guards himself against the error of diminishing the value of any man's works because of a personal antipathy. And, on the other hand, he is just as careful not to make the equally great mistake of exaggerating the virtues and attainments of those whom he loves or likes.

He measures facts on honest scales, and weighs folks as he finds them, not as he hopes, or hears, or wishes them to be.

He forms no definite opinion on any subject until he is qualified by the possession of information, sufficient to reach a sane, unbiased conclusion.

He does not heed gossip or slander. The one is bred of thoughtlessness and the other is bred of malice.

He despises the anonymous attack.—Honesty never wears the badge of the sneak. Truth does not hide in the grass.

He waits to hear both sides of a quarrel and insists upon maintaining a neutral attitude until he knows enough to judge fairly.

He admires many whose essentially personal characteristics and inclinations do not appeal to him.

Admiration is the approval of deeds. It is a calm, clear sum total of abilities, in the addition of which the symbols of friendship do not figure.

Many men in whose company he finds no pleasure, and whom he does not desire to meet upon an intimate social basis, none the less receive his enthusiastic approval of their achievements.

He searches beneath dress and under address for ability and stability. He knows that tailors cannot change the cut of a man's character, and that talent is not always glib in its expression. He does not make the common error of confusing education with intelligence. The world is filled with good brains which have missed the opportunity of training. Intelligence is an instinct and an experience, while culture is largely a schooling—a memorizing of facts and rules and incidents. Initiative cannot be taught; creative tendencies cannot be lectured into a head; the senses of honor, of self respect, of dignity, of charity, of construction, of leadership, are birthrights.

He is never a snob. He exercises his right to choose for associates those with whose ideas and ideals he is in sympathy; but he does not assume that the rest of the world is thereby wrong or inferior or foolish.

Copyright by Herbert Kaufman.

Engineering in the Construction of the Outside Plant

Factors in the Planning of New Plant or the Provision of Additional Facilities for Existing Plant—Determination of Estimated Number of Telephones and Classification of Possibilities—Distribution of Facilities and Layout of Cable Plant

By B. C. Groh

In planning the construction of a new telephone property, or additions to existing plant either for additional facilities in territory already built or for the opening up of new districts, all work should be laid out with the following continually in mind:

a. All plant installed so as to avoid the necessity of replacement until its normal efficient life has been reached.

b. Adequate facilities provided in order that all business

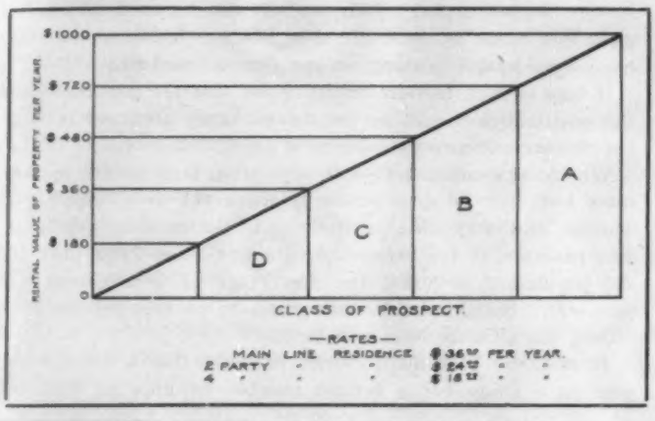


Fig. 1. Chart of Service of Designations.

solicited and offered may be accepted, but such facilities to be provided with a reasonable plant investment and so installed as to result in the minimum of idle plant.

c. All plant installed to be so designed as to interlock with existing facilities, and also with such additional extensions and new work as will become necessary from time to time.

It will be seen from the above that a study embodying these important points in plant design, involves a considerable study of the future of the district, both as to the ultimate population and the character of the community as a whole. Such a study is usually known as a development study and the conclusions made after such a study are designated as the fundamental plan. In Independent telephony it is deemed advisable to plan for approximately 15 years ahead, and the fundamental plan should provide for a certain number of telephones in a definite area at the end of that period. The study in reality is for a certain number of lines and the fundamental plan will hold good if the specified number of telephones is reached a few years prior or after the designated date. The initial point to determine, therefore, is the estimated number of telephones for the community at various times up to a period 15 years from the date of the fundamental plan.

The most practical method of determining the estimated number of telephones is by an actual count of the existing possibilities, assuming that these possibilities will be converted to actual subscribers two years after doing the initial work called for in the fundamental plan. In making the count of the actual possibilities, it is necessary to classify them so that the cable or wire plant may be designed to properly and economically provide facilities. The greatest difficulty will be experienced in the residence districts, and it is advisable to classify all possibilities on a basis of the rental value of the property. It is assumed that, if properly solicited and an efficient service provided, 5 per cent. of the estimated rental paid by a family can be expected for Independent telephone service. For example, if a family pays a monthly rental of $50 or the premises has a rental value equal to that amount, that family can be solicited for $2.50 worth of local telephone service per month, and it can reasonably be expected that amount will be realized two years after the initial work.

As an example of the application of this system, let it be assumed that the following will be the residence rates during the fundamental plan period:

Single line .....$36 per year or $3.00 per month
Two-party line ..... 24 per year or 2.00 per month
Four-party line ..... 18 per year or 1.50 per month

The prospects can be classified as follows:

Class A.—All residences having a rental value of $720 per year and over. All such residences can be expected to take main line residence service, if the rate is $36 per year.

Class B.—All residences having a rental value between $480 and $720 per annum. All such residences are expected to have a service better than four-party if the two-party rate is $24 per annum. For convenience it is safe to assume that the average will be:

50 per cent. Main line residence, at .....$36 per year
50 per cent. Two-party line residence, at..... 24 per year

Class C.—In this class will be included all residences having a rental value between $360 and $480 per annum. The class of service assumed will be:

50 per cent. Two-party line residence, at.....$24 per year
50 per cent. Four-party line residence, at..... 18 per year

Class D.—This class will include all residences having a rental value less than $360 per year or $30 per month. Considerable judgment must be used in determining the residences which have a rental value such as to assume no possibilities of telephone service of any character. Under average conditions it is felt safe to assume that no telephone service can be expected in residences having a rental value less than $15 per

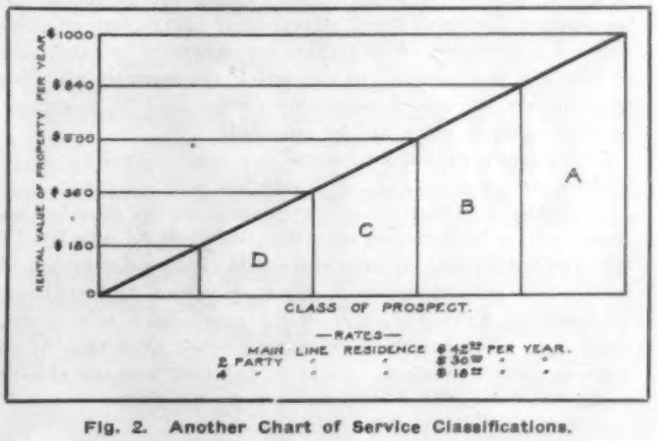


Fig. 2. Another Chart of Service Classifications.

month or $180 per year. In some instances it may be advisable to place this limit at a somewhat lower figure. One-half of the residences having a rental value of between $180 and $360 per year can reasonably be expected to have telephone service of the cheapest class offered, provided the lowest rate is $1.50 per month. Therefore, in making the count of possibilities it is safe to assume that 50 per cent. of the resi-

dences having a rental value between the figures mentioned will have four-party line service.

A summary of these classes of service, with the rates as assumed, is shown in Fig. 1. The correct values to be assigned to the various classifications for other rates can be easily designated on a similar chart in the following manner:

On a sheet of cross section paper draw a diagonal line from the lower left-hand corner to the top right-hand corner. On

BLOCK	A	B	C	D	E	F	G	REMARKS.
21	3	3				3		
	2	4	2					
	5	6	2			3		
	5	4.8	1			3		14
22	3	6	1			2		
	1	3	1				1	2 Vacant L.
	4	9	2			2	1	
	4	7.2	1			2	.6	15

Fig. 3. Sample Record Sheet of Service Possibilities.

the left plot the various rental values. At each rental value, of which 5 per cent. equals the rate of the various classes of telephones, draw a horizontal line until it intersects the diagonal line and from the point of intersection draw a vertical line to the bottom of the sheet. To ascertain the correct classification of a residence, estimate the rental value and follow the horizontal line until it bisects the diagonal line. The classification will then be as designated immediately below the point of intersection. In Fig. 2 is shown a chart for the following rates:

Main line residence .....$42 per year
Two-party line residence ..... 30 per year
Four-party line residence ..... 18 per year

Business places should be assumed to have either main line business or two-party line business. It is not deemed advisable to assume a grade of business service less than two-party at the end of the initial work called for in the fundamental plan. The classification of business possibilities should be made with no set rule, as no assumption of the class of service possible to be obtained can be assumed from an estimate of the amount of floor space occupied or the character of the premises. As a rule, the cheaper grade of service can be assumed for small retail stores, cigar stands, barber shops, and other localities of like character where it is inadvisable to install a pay station. In estimating the business classification, the private branch possibilities must also be ascertained so that adequate plant will be provided.

The number of lines to allow for each possibility of the various classes is as given in Table No. 1.

It will be seen that should the possibilities be classified and their location be indicated on a map, they can be translated to the required number of lines in each block in order to provide service for such possibilities when converted to actual subscribers. In making a count of the possibilities, a convenient method is to arbitrarily number each block on a map of the community. A notebook should be provided and the class of possibilities designated in each block in this book. A suitable ruling is shown in Fig. 3.

It will be noted that four lines are allotted to each block. Two lines are allotted for the classification, as it is not feasible to ascertain the correct classification in more than two or three sides of a block at one time. The third line is for totaling the possibilities and the fourth line is for the number of lines required for the total of each class. This is obtained by multiplying the total possibilities of each class by the factor shown under the head of "Lines to each possibility" in the table. The figure at the extreme right is the total lines necessary to accommodate the possibilities in the block. It is the sum of the figures on the fourth line, omitting decimals. The figures representing these totals should be placed on a map of the community. Under remarks should be noted the vacant property and the estimated classification of any new building that may be erected.

The total lines entered on the map will be an estimate of the requirements two years after the completion of the work called for in the fundamental plan, and this work should provide facilities for the acceptance of this service. Should an estimate of the probable revenue be desired, the totals of the various classes of residences as shown in the notebooks can be made and this feature ascertained.

The next step is to ascertain the estimated population for the end of the period called for in the fundamental plan. The usual method is to obtain the population for several years and plot these figures in a curve and then to extend the curve to the 15-year period. Judgment should be used in deciding upon this curve as there are many factors involved that may have considerable bearing on the future population.

It may be well to state at this point that the population and the possibilities should be for the exchange area and not only for the present corporate limits of the community.

When the estimated 15-year population is obtained, the ultimate lines can be determined by using the development percentage of the existing possibilities to the existing population. For example, if the present possibilities show 1,000 lines and the population is 20,000, the percentage of development is 5 per cent. Should the 15-year estimate of the population be 30,000, the ultimate lines will be 1,500.

It must be continually borne in mind that a fundamental plan is a study for a certain number of lines in a defined

Class.	Number of Lines to Each Possibility.	Service Assumed.
A. Residence	1.0	Main line.
B. Residence	0.8	50 per cent. Main line, and 50 per cent. Two-party line
C. Residence	0.5	50 per cent. Two-party line and 50 per cent. Four-party line
D. Residence	0.2	50 per cent. Four-party line and 50 per cent. No service
E. Private branch exchange	4.0	Main lines
F. Business and pay stations	1.0	Main lines
G. Business	0.6	Two-party line

Note—An average of two trunks is assumed for private branch exchanges, plus one line for battery supply and one for generator power.

Table No. 1. Line Allowances for Service Possibilities.

district, and not for a certain number of telephones. In planning exchange facilities the number of lines or cable pairs is the interesting factor. This fact is mentioned at this point as it is the custom to state the development percentage as that obtained from the relation of total telephones to the population. It is obvious that such a per cent. will be considerably higher than the per cent. indicating the number of lines as is used in fundamental plan work.

(To be continued.)

Taxation Value of Indiana Companies.

The valuation of telephone companies in Indiana for the purposes of taxation has been placed at $14,788,406 by the State Board of Tax Commissioners, an increase of $1,354,385.

June Fancies

Some Financial Fancies—Money Troubles, Etc.

By J. C. Kelsey

A Chicago advertising man failed the other day.

This is not strange since so many men fail in business, have a fire or do something foolish. Ninety-five per cent. of business enterprises are failures or prove disappointing to their promoters.

I doubt very much if even a fraction of 1 per cent. were ever as successful as their prospectus indicates.

The failure of the Chicago man was destructive. His liabilities were $174,000, but his assets were nothing, not even a shirt on the man's back!

However there was one asset, although it is doubtful now if it could be capitalized. That asset was the man's gall! He proposed to his creditors a bold and wonderful idea. Really, it was a shame they turned him down.

All he wanted was to have the creditors raise new money and let him run things for two years without molestation. And he would not guarantee any return on the old debt, nor the new money!

"Truth is stranger than fiction." The creditors turned him down cold.

Of all the spineless mollusks of the human race, the average investor holds the belt. He has no equal. No one knows where he will invest next. And even he, himself, asks no guaranty, except a nicely worded prospectus or a promoter's promise.

A share of stock is nothing but a scrap of paper. It promises nothing, and it guarantees nothing. When you send your money away for a nicely embossed stock certificate, you paralyze the arm of the law.

There is no redress. The only solace you usually get is a post mortem statement!

It strikes me that these creditors of the Chicago advertising man have broken a record or established a precedent.

Ordinarily, creditors meekly take what the brazen looters have offered. No individual creditor was ever known to raise his voice above whispering protest.

Most men will fight when openly insulted. But financial loss or insult to his business intelligence leaves him weak and dispirited.

His losses make him cowardly, not desperate.

Of all the pitiful groups of human beings, it is a bunch of shame-faced creditors, each openly branded as a sucker!

A sucker is usually sensitive and he likes to keep his wrongs to himself. He meekly accepts crumbs from the debtor's table, and tries to lick the hand that brushes them off.

About all the creditor gets is crumbs. I am glad that $174,000 worth of creditors had the nerve to refuse crumbs, and the sense to positively refuse to send more good money after the bad.

If we could learn to swallow small losses, we would not see so many big ones.

The hardest game in the world is the resurrection of a dead or dying business. And the financial world is most liable to pass by on the other side of the street when you go to them with a rescue proposition.

The queerest phase of American financial life lies in the treatment of defunct properties.

Each investor is either afraid of being assessed or ashamed of his participation in a losing game, and hates to expose his folly. Consequently, a defunct business is a sort of an orphan seeking adoption.

The court appoints receivers, usually the same bunch who were officers of the old company, and whose incompetence materially assisted in its downfall. The incompetence, or carelessness or crookedness of the old management passes on to the reorganization.

Sometimes even the judge protests against appointing these same men. And he appeals to the creditors for advice.

Bless me! A creditor is so scared that he cannot speak. And so the receivership goes on until receivers' certificates are not much better than the defaulted bonds.

Last week a great railway system failed. The court appointed receivers. The same men who administered the affairs of the road on its way to ruin have been appointed receivers.

Surely the judge can not be blamed. No doubt he realized the awkwardness of the situation, but no one helped him out of his truble. But there seems to be trouble ahead.

While remarkable, it is true that investors are asking for an investigation. They are asking the Interstate Commerce Commission to take a hand.

It certainly must be within the province of the commission to inquire into failures, especially of bonds which were only sold a few weeks ago. If you bought Frisco bonds in March and the road failed in May, would you not have the least suspicion of being stung?

Would you feel any better toward the Frisco management than you would toward a bank which took your deposit on Monday and suspended payments on Wednesday?

Within the last year, French investors have taken $30,000,000 of these bonds; taken them upon advice of their bankers who are supposed to investigate properties before buying bonds and offering them for sale.

It is said that French investors believe the bankers will take the bonds back and return the money. If they do, I will expect to pick up fallen stars in our streets.

The bankers should have known that a 5 per cent. bond at $78 is a dangerous thing anyway.

Besides, Frisco feeders were losing money. Can a feeder, costing $130,000 a year to run and earning $83,000, pay bond interest? And there were numerous feeders which were just as heavy losers.

But not a word has been said about the construction company which built these railroads with the bondholders' money. It's dollars to doughnuts that construction company will not go into the receiver's hands!

Does it occur to you?

A big railroad has failed. Outside of a stock flurry for a few days, the excitement has all died down.

Just because one or two big railroads fail, nobody starts out to denounce the railway business as a bad one.

A few bankers get caught in some irrigation enterprises—they had been entirely carried away by their cupidity. But today we learn that the irrigation business is bad! And think of the tons of paper used to exploit a few telephone failures! It was a pretty picture.

One telephone interest denouncing the telephone business as bad, simply because they had been forced to become competitors of a new telephone system!

Remember, that so-called Independent telephony was an originating business, not a competing or duplicating one. The Bell company was caught asleep. And they are responsible for the so-called waste of duplication.

Talking about duplication, I never did believe it was such a crime. And at Kansas City last week I learned something more. A telephone call can not be duplicated!

The Kansas City Home Telephone Co. is the busiest telephone system in the world, I do believe. Such a rush of traffic! The Bell company is also busy.

If, by any reason at all either company should be absorbed, nothing will be saved. Each company is carrying all it can with its present facilities. Not one exchange could be abandoned. Not one pair of cords could be missed. Not an operator could be dispensed with.

But I am digressing. I want to stay on the trail.

Railroads have failures, but nobody says anything derogatory to the railroad business. No banker opens his head. If he has losses he swallows them calmly.

But when you mention telephones to him, he strokes his venerable beard and changes the subject.

I get numerous letters from all over the country, asking about getting money in Chicago to finance telephone properties. Whether it would do any good to come to Chicago to talk over the proposition, etc.

It always pains me to have to tell them to stay at home; that they could not get a pleasant smile from a bank; and if they did it would be on an 80-cent or less basis and more than half the common stock.

I wore my feet out on a bond issue which overclassed any bond offered in Chicago. I met with derision almost everywhere.

Yet the same people were handling hydroelectric properties where the next flood would annihilate the dam! And possibly other bond issues just as shaky and as sure to default.

I can't give any reason why telephone bonds are in bad, but they are.

Bonds are handled around Chicago as recklessly as automobiles. A bond can be as rotten as a share of stock, and even be worse—not worth the paper it is written on.

Something happened in Chicago which shows how fallible and how easy the average money changer is.

A summer hotel had $30,000 worth of bonds to sell. A 19-year-old boy, who was a messenger around a bond house, went into business for himself.

The summer hotel bunch and the 19-year-old financial prodigy got together by some hook or crook.

The child wonder undertook to sell the bonds. And he coaxed the hotel folks to deliver the bonds to him, as he had purchasers close at hand.

The boy took the bonds to the bank and borrowed money on them. He bought two pretty bright low-browed automobiles and a fine home in Oak Park.

Finally the boy wrote out checks to pay for the bonds. But there were no funds in the bank to meet the checks.

Something was doing in a moment! The bank's officials got hold of the boy. They rushed him to Milwaukee where he was supposed to be heir to millions.

On the way to Milwaukee he convinced the bankers that his estates occupied both sides of the railway. He was so convincing, this child wonder, that the perplexed bankers were quite mellow when they reached Milwaukee.

In the meantime, the kid conveniently remembered a safety vault full of securities. And the bank representative telephones the Chicago bank to honor the checks!

But the safety-vault was fiction. The money was paid out. Again they rushed the boy to Milwaukee and jumped in upon his unsuspecting grandmother, and they actually frightened that poor woman out of $30,000.

When she came to, and realized her utter irresponsibility in the matter, she sued for recovery. But the Chicago bank hung on to the money. They did not care whose money it was, as long as they had it. High class morality as well as intelligence, isn't it?

So you who want to come to Chicago with a decent legitimate proposition, just pause a little.

Your plans are too intelligent for the average financial circles—and too commonplace.

You have no imaginary safety vault full of Spanish doubloons. You can not appeal to their imagination. So you can see it is made hard for legitimate enterprise.

Just as a cash payer has to pay for the dead-beat, so your legitimate plans suffer because some 19-year-old child can skyrocket around and worry a bunch of financial gray-heads.

Just because Frisco failed, legitimate American railway stocks suffered. Union Pacific, Katy, Erie and others were thrown on the market in a panic. Not only will the Frisco investor lose, but the investor in the legitimate stocks, because he has been frightened.

From the signs of the times, you can see that investors are learning something. And that they are beginning to fight for their rights. And further, they are keeping away even from legitimate things which are not real bargains.

The state of Tennessee has its entire debt fall due this year. The bids for the bonds are so low that the state will not accept them. Just what will be done is problematical.

Canadian Northern offered a big bond issue in London—16 per cent. was subscribed for.

Indigestion is not purely local, it seems to be world-wide!

Credit is a peculiarly sensitive plant.

You are often hurt by rumors more than by great physical damage.

In spite of the Mexican revolution, and the presumably instability of the government, the $100,000,000 bond issue was over-subscribed. Also, the Mexican Central Railway had no difficulty in refunding its debts.

Credit seems to withstand the stresses of revolution, rapine and ruin. But it does not thrive at all under suspicion of graft and mismanagement of big railroads.

It seems, after all, that "honesty is the best policy."

There is no suspicion of graft and mismanagement of telephone properties. Yet it will do no good for you to come to Chicago, New York and the larger cities to talk it over. Your properties are too stable and reliable, and there is not enough excitement.

But if you have any securities in a rusty vault, and the key is lost, come on! But keep your grandmother hidden when the storm breaks.

Giving grandmothers a "shake-down" or a touch of the third degree is a new thing in finance.

Remember, you might make use of it!

Don't be surprised any day to have to make up losses, due to some one else's stupidity.

It is a new form of polite brigandage!

MORAL: Wonders never cease to attract!

A Quartet of Men Prominent in the Telephone Field

JOSEPH BRUFF WARE, of Ashland, Ore., was born in Butlerville, Jennings county, Ind., in May, 1860. After attending grammar and high school at Grand Rapids, Mich., he spent two years in the agricultural college at Lansing. He began telephone service in June, 1895, with the Citizens' Telephone Co., Grand Rapids, Mich., and from 1895 to 1901 was business manager and acting treasurer of all properties of that company. He built and by July, 1896, completed the first Independent copper toll line from Grand Rapids to Holland, and also built a line to Cadillac. In 1896 he organized the Michigan Telephone Association and served as its president until 1901. From 1901 to 1902 he was general manager of the People's Telephone Co., Detroit, and in 1903 went to Buffalo as treasurer of the Inter Ocean Telephone & Telegraph Co., helping to build Hubbell's toll line system. He was secretary of the New York Telephone Association in 1903, and was secretary of the National Association in the years 1903, 1908-9-10. He was engaged in the lumber and shingle business as manufacturer and dealer from 1881 to 1905.

A. J. VERNIER, director of the Eastern Illinois Independent Telephone Co., Kankakee, Ill., and now engaged in the brokerage business in Chicago, was born at Archbold, Fulton county, Ohio, in September, 1865. He was educated at the Archbold high school and attended the Notre Dame University at South Bend, Ind., and Hiram College. He entered the telephone field in 1898 to provide telephone service in Archbold when he was engaged in the mercantile business. He assisted in financing the Home company to construct an exchange, and build farmers' lines. A toll line was also built to Fayette, Ohio, and Mr. Vernier assumed the management of the plant established there. He organized an Independent Construction company and for several years engaged in building toll lines, farmers' lines, and exchanges in Union City, Ind., and in seven or eight Ohio cities as well as toll lines to every town in Harrison county. Exchanges were also built at Kankakee, Manteno, Pontiac and Grant Park, Ill., and numerous toll and farmers' lines. Mr. Vernier is a Mason and an Elk.

O. F. BLASIER, president and manager of the Shell Rock Valley Telephone Co., Greene, Iowa, was born in Oneida county, N. Y., in 1853. He removed to the west in 1874, settling in Iowa, where he engaged in the cattle herding business for two years, after which he purchased a farm near Greene, Butler county, Iowa. Five years later he removed to Greene, and in the fall of 1898 became manager of the telephone exchange in that city, which at that time was owned by the Greene and Western Telephone Co. In the following spring he purchased the Greene exchange and built a toll line from Greene to Marble Rock and to Rockford, in Floyd county, Iowa. He organized a company known as the Shell Rock Valley Telephone Co., became president and manager of the company, and has continued in this capacity since that time. Mr. Blasier has, therefore, been identified with telephone management and development in the Independent field in Iowa for the past 15 years. Mr. Blasier is an M. W. A., an M. B. of A., and a 32nd degree Mason.

CHARLES IRVIN HICKMAN, salesman for the Holtzer-Cabot Electric Co., Chicago, Ill., was born at Watseka, Ill., in April, 1880, and after completing work in common and high schools of that city he taught country school from 1898 to 1899. He then entered Purdue University, receiving degree of B. S. in E. E. in 1903 and E. E. in 1908. Began shopwork with Western Electric Co., Chicago, in 1903 and was installer with that company from 1904 to 1905. From 1906 to 1907 was engaged on circuit development work and telephone experimental work of New York engineering laboratory of Western Electric Co., and assumed charge of laboratory in 1907. In 1908 he was given charge of the commercial engineering for the same company. Since 1908 Mr. Hickman has been connected with the Holtzer-Cabot Electric Co. as motor and telephone salesman. He now has charge of the telephone sales of the Chicago office and handles all circuit apparatus. Mr. Hickman is an associate member of the American Institute of Electrical Engineers and he has been president for the past year of the Purdue Alumni Association of Chicago.

Telephone Communication in the Control of Central Stations

Use of the Great Public Utility by Power and Lighting Companies—Installations of Various Companies—Telephone's Part in Relations Between Companies and the Public—Paper Presented at Annual Convention of National Electric Light Association

By Angus S. Hibbard

Where one brain and one pair of hands best fitted to any task may be put in control of all its elements, we may look for the most highly finished product. In science, in the arts, in literature or invention, the best things have nearly always been those accomplished by some one individual. Such personal accomplishments may represent an ideal in quality, but this ideal cannot well apply in quantitative undertakings involving a large number of people or elements, and the man who thinks he knows it all and tries to do it all is rarely successful or popular in matters of any considerable size. Organized effort, however, shows its appreciation of the personal ideal by endeavoring to set up conditions whereby some one master mind at the top may give out the plan and policy to be pursued, and, through established channels, direct the efforts of all concerned. The same thing is true down the line where heads of departments and sub-departments, all inter-related, direct personally those things for which they are accountable.

It has been said that a business is at its very best when its purposes are best accomplished, and the management has the least to do. Some one put it more tersely, saying: "If the bosses can ever truly say that they have nothing to do, it will be time to raise their salaries." Such statements, however, must be accompanied by equally convincing statements of conditions as they actually exist, and to state fully the condition of any business, there must be available full knowledge of just what is going on.

In many businesses information relating to existing conditions may be gathered more or less at leisure or as may best suit those who are in charge. A store may be closed to take inventory, or a factory shut down for some general overhauling. Both may control their methods and quantity of output, while the public, broadly speaking, is not affected. Not so are the public service businesses, the railways and carriers of all kinds, the water, gas, electric light and power companies, the telegraph or telephone companies, all of whom must render service, not when and as they choose, but when and, to a controlling extent, as their customers, the public, may choose.

Railways must provide trains at such times as people wish to travel—they cannot make them travel at times most efficient from the point of view of railway operations. Electric light, power and gas companies, telephone and telegraph companies must provide facilities to fit a load line, which is established by the public and is something over which the companies, themselves, have no control.

The Service Problem of Public Utilities.

In the public service business we have, therefore, conditions constantly changing because of demands which are practically uncontrollable, requiring not only the best kind of organization and management to insure success, but the best and most comprehensive means of knowing just what is going on, not from day to day, but constantly, from minute to minute, during what may be called a continuous performance, and there can be no closing down for inventory, or repairs, or anything else. The wheels must continue to go around, and the public, without previous notice, determines just how fast they shall go. Under these inevitable circumstances it may be said that the best service is rendered by those who keep in the closest and most necessary touch with the fluctuating conditions of this public demand, and in turn, have the best and most immediate control of the means of meeting it so that, as nearly as possible, some one officer in charge may observe and direct operations.

All utilities are expected to be so designed that they may provide for average maximum demands for service. Probably no utility could be either well or profitably managed if designed to provide for the extreme possibilities of service. No railway, for example, could suddenly carry all the inhabitants of a large city at one time, or even in one day. In no telephone exchange could all of the subscribers talk at one time. Indeed, it has been said that if all telephone subscribers should call at once, everybody would get nobody, and nobody would get anybody. The average maximum demand, therefore, is studied and provided for, but even in this, not all utilities are affected alike in case of overload.

In railway or street car service, sudden emergencies are met by carrying as many passengers as possible, but the demands of those who are not carried may not seriously interfere with the successful transportation of those who are provided for. Sudden demands for gas are supplied from the storage reservoirs of gas companies, and if not too long continued, may not interfere with the general service. Sudden demands for telephone service, although complicated by the fact that two patrons, instead of one, enter into the problem of handling each telephone call, may be taken care of to the full limits of the system.

In electric light and power service, the problem seems to be quite different, because in case of excessive overload, the entire service is affected. In large communities it is the practice to provide a considerable margin of supply over and above the average maximum demand which may be reasonably anticipated, but in such a case, if this maximum demand suddenly doubled, the system would break down and no service could be rendered to any patron. Moreover, electric light service seems to be subject to, perhaps, more sudden demands than other services. The load line between minimum and maximum averages is, under normal conditions, fairly regular, but changing conditions bring about sudden and violent variations. A sudden storm, bringing about a temporary condition of partial darkness, may, in ten minutes, increase the lighting load 100 per cent., requiring the services of additional boilers, engines, dynamos, and all sources of output, as well as a rearrangement of the facilities of distribution.

It is not surprising to find, therefore, that electric light and power companies, realizing these conditions, stand in the lead in providing unusual facilities for intercommunication and centralization of control, and, by extensive and well engineered systems of telephones and supplementary appliances, have installed most efficient and up-to-date means of knowing just what is going on, and for directing their service.

The time seems to have gone by where, even in small light and power installations, the management is satisfied to start up the machines and let them run along without regard to rate of use or volume of output. With the growth of these plants and the consequent needs of greater efficiencies and economies, it has been necessary to secure

more immediate and extended knowledge of operating conditions, and a more centralized control. These results have been obtained in the greatest degree where the best means of communication between all elements of the business have been supplied. An outline of what has been done by the lighting and power companies in a few of the larger cities will illustrate present conditions, showing the endeavor to centralize the control of their great systems so that one brain and, as nearly as possible, one pair of hands, may best direct operations. As the relative capacities of the various plants are well known, they need not be referred to in detail.

Use of Telephone by New York Edison Company.

In the city of New York, the two Waterside plants of the New York Edison Co. constitute the producing center, at which an officer called the "System Operator" directs the operations of the entire system. It is his duty to keep in service at all times sufficient generating, transmission, and transforming apparatus and to take care of any demand on the system, and no apparatus is put in or taken out of service except by his direction. He is provided with a telephone switchboard, from which lines run to 42 substations, also, trunk lines by the city exchange. The switchboard is ordinarily used by two operators (the equipment being duplicate throughout) but it is so arranged that, during emergencies, six operators are afforded facilities without interference. To this switchboard there are duplicate battery and signaling leads from two separate telephone exchanges. The building wiring is divided and led through separate building conduits to provide against local interruptions, and all of the substations are equipped, not only with direct trunk lines from this operating center, but from the city exchanges. The wires are led in through separate cables, and where possible, from different streets, to avoid interruption from fire or other causes.

From this operating switchboard pneumatic tubes extend to the telephone switchboards at each of the Waterside stations, and through these tubes, all routine instructions of the system operator at the switchboard are sent in writing, confirming telephone instructions.

Directly in front of this board, and in full view of the system operator, is being installed the so-called "pilot board," designed to show, automatically, the operating conditions of the entire plant. At each end of this board, boiler and current recorders show the existing output of boilers and generators for the two stations. On the face of the board the districts of each of the substations are subdivided into small panels, indicating the oil switches by numbers given to the feeder leads. The conditions throughout this distributing system are shown by small electric lamps. A red lamp lighted shows that a switch is closed, a green lamp lighted shows that a switch is open, and these lamps are controlled automatically by the switches themselves.

At each end of this pilot board, the instruments which indicate at all times the total load carried by each station show how the load is divided as between 25-cycle and 60-cycle systems, the voltage and frequency of each system, and the current, if any, which is flowing from one station to another. In any emergency, therefore, by a glance at these instruments and the pilot board, the system operator is as conversant with the conditions at each station as though he were standing before all of the switchboards at the same time. Consequently, he is instantly in a position to direct by telephone, the resumption of normal conditions without the delay heretofore necessary awaiting reports from switchboard operators as to their conditions, these conditions now being displayed automatically before him.

Previous to the use of the pilot board, the system operator received all reports of outside conditions by telephone, and indicated operating conditions throughout the city by the use of colored tags, suitably numbered, and placed upon a large operating board representing the distributing system.

The Signaling System.

To still further safeguard the service during emergencies, the New York company has installed a signaling system consisting of standard fire alarm apparatus comprising circuits reaching substations, so arranged that the system operator may send signals over all or any combination of the circuits at one time, such signals being recorded on paper tape and time stamped. For each signal there is provided a small brass wheel with notches corresponding to the signal number cut into its periphery. The signal numbers represent a predetermined code of instructions for this emergency service. For example: "2 2, trouble at Waterside; 2 4, system grounded, look over your apparatus and promptly report conditions to system operator; 4 7, conditions normal; 6 6, time signal. Correct time is 12 o'clock noon." This latter is used as a daily signal to test out the system, which, as indicated, is designed to care for unusual emergencies.

Adjacent to this signaling system is the city fire alarm signaling apparatus, by means of which all alarms turned in on Manhattan Island are received by the system operator. This apparatus was installed in connection with the city high pressure pumping stations, current for which is supplied direct from the waterside plants. As these high pressure stations use current only when there is a fire, the system operator, by receiving all fire alarms, knows just when the pumping motors may be expected to start, and is kept in touch with the situation during the progress of any fire.

Located at the side of the switchboard are boiler signaling switches, by means of which the system operator signals to the boiler rooms the number of boilers required to carry the load. All routine communications between switchboards and the turbine rooms are carried on by means of lamp signals, and attention is called to them by means of electrically operated steam whistles. As weather conditions affect, to a very large extent, the demand on the stations, an outlook is stationed on the roof of the Waterside building every day in the year except Sundays, with a direct telephone line to the system operator, to report any unfavorable weather conditions.

During the winter months, the load of the Waterside stations increases from 4 to 5 o'clock in the afternoon about 90,000 k. w., or at the rate of 1,500 k. w. per minute, and during thunder storms in summer it may increase 50,000 or 60,000 k. w. in from 5 to 10 minutes or at the rate of 5,000 to 12,000 k. w. per minute. To take care of these peak loads, reserve boilers are carried under steam during the entire year.

When there are indications of a storm, the boiler rooms are signaled for the reserve boilers and additional turbines are started, connected to the bus bars. During the approach of the storm, steam is shut off from these turbines and they are run as motors, in this way being available to take their share of the demand in about ten seconds. With the coming of partial darkness, the load advances so rapidly that it is practically impossible to so control the substations as to keep the load divided between the Waterside stations as apportioned. During such periods the flexibility of the system, due to the parallel operation of the two stations, is apparent, excessive loads of one stations being relieved by the other. At times, from 10,000 to 20,000 k. w. may be going from one station to another in one minute, and a few minutes later this condition may be entirely reversed. Successful operations under these extreme conditions is evidently made possible by the centralization of control which has been described, and this, in turn, is made possible by

the systems of intercommunication which bring to the one official in charge knowledge of what is going on, and furnish the means of carrying out all possible directions.

Provision for Intercommunicating Service.

In the switch rooms of each of the Waterside plants, there are installed switchboards, with lines extending to the board of the system operator, the turbine room, the exciter switchboard and the company's operating department branch exchange. There is also an intercommunicating telephone system, with from 20 to 30 stations, located in various parts of the switchboard galleries. In each of the Waterside stations, telautographs are also used between the high tension switchboard and the excited switchboard, so that instructions may be recorded. Here, again, we find that one directing head in each power station may control by telephone all parts of his plant as directed by the system operator, the endeavor being to provide a completely centralized system of information and control. In the substations, telephone switchboards are located, connected by trunk lines with the switchobards of the system operator, the plant and service departments, the general offices and the telephone exchange.

For the plant and service operations of the company, a four-position switchboard is installed in the supply department, Forty-first street, with 26 trunk lines connecting with telephone exchange, and 116 extensions and trunk lines reaching the general offices, the district headquarters, branch stations, contract offices, etc., there being 11 trunk lines to the general offices, five to the second district, two to the third, etc. None of these trunk lines or extensions is listed in the telephone directories. It is not expected that the public through the general telephone system, will, at any time, be brought into communication with the company through this system, which is provided for the exclusive use of the company's employes, upon its business between various offices and branches throughout the city. For these purposes it is carrying a traffic of about 5,000 calls per day at the present time.

A special telephone directory is printed by the company giving locations and telephone numbers of offices and stations, and names and numbers of officials and departments, both for regular service and for night, Sunday and holiday calls, the residence telephones being used to call out the forces at such times.

Telephone Installations in Other Cities.

In Chicago, the Commonwealth Edison Co., in addition to a 12-position switchboard operated as a main exchange and connected with all operating plants and branches of the company, has what is termed a "Load Dispatcher's" board, with outside trunk lines and 80 terminals or extensions used for operating purposes, which gives the load dispatcher's office direct communication with all the power plants and distributing centers. Each of the large generating stations is provided with a switchboard with outside trunks and connecting trunks to the company's main switchboard and terminal stations throughout the plant. In addition, each of the generating stations is provided with an intercommunicating telephone system reaching ten different points. The load dispatcher's switchboard of four positions is independent of the company's main telephone switchboard, and as nearly as possible, wires to these boards and all others in substations or generating plants are conducted over separate routes to avoid interruption of service. These teleprone facilities are supplemented by appliances indicating automatically at each station the output of the other stations, making possible, to a certain extent, the operation of different stations according to predetermined schedules.

In Boston, the lighting and power system is controlled and centralized by means of a principal supervisory telephone exchange, with five tie lines to the company's main exchange, two trunk lines to the South exchange, and 42 circuits to outside power plants. The company's principal exchange is a six-position switchboard, with 36 trunk lines and 193 stations, and in addition, a special supervisory switchboard in the commercial department—an elaborate system for reaching customers and the general public.

In Philadelphia, Pittsburg, Cincinnati, St. Louis and other cities, the lighting and power companies are utilizing telephone service in a like manner for centralizing information and controlling operations.

These telephone installations and the elaborate supplementary systems installed in a few of the larger cities certainly indicate the value of such service, and particularly the advantage of separating from the service essential to the company's own operations within itself, the public telephone service connected with customers and the general telephone exchange. The introduction of such special and separated service and its successful use over a considerable period, seem to show that it is well worth while.

From the very nature of electric light service, it is essential that there should be means for the quickest kind of communication between the company and its customers, and the telephone is naturally used for that purpose. Here, again, it is interesting to find that the companies in many cities have specialized on the telephone and developed methods which not only increase the efficiency of their own service but which, to some extent, have been followed by other corporations, and might well be followed by all telephone users.

We find in Chicago, in the offices of the Commonwealth Edison Co., a main private branch exchange of 12 operating positions, with 100 trunk lines and connecting trunks, and 475 terminals and extension telephones. Traffic reports show that about 17,000 messages are handled daily, or upwards of 5,000,000 calls each year. In connection with this main switchboard, there are two subsidiary boards in the testing and contract departments, and also about 30 so-called key cabinets, or intercommunicating switches of from two to ten-line capacity, each in lieu of a subsidiary switchboard, the principal installations being in repair and renewal departments where a great many customers' calls are received by clerks trained for this purpose.

In the plans being made for the removal of the general offices of the Commonwealth company in 1914, a 30-position telephone switchboard is being provided for. In the commercial work of the company, telephones are provided for solicitors, the lines of which are connected to a monitor switchboard, so that, in the absence of a particular solicitor, the monitor board operator may answer calls, insuring prompt attention to the customer. Applications for electric service are accepted by telephone as a part of the regular commercial work. During 1912, 13,609 such applications were recorded, together with about 5,500 orders regarding meter service. During the last five months of 1912, there were 8,149 telephone inquiries regarding service, and 12,672 requests for solicitors to call.

Telephone in Relations Between Public and Company.

The above figures indicate the growing relations between the public and the company with regard to contracts for new service, as well as carrying on existing relations by means of the telephone.

The Commonwealth company was, perhaps, one of the first to extend its telephone facilities largely into this public relation. The second edition of its book of instructions, entitled "About Telephones," is dated November, 1911, and states that "The telephone, which was a relatively unimportant adjunct to our business 16 years ago, is now the principal medium of communication with our customers. . . . For this reason, it is a matter of the most vital import-

ance that our telephone service, which we aim to make the best in the city, should be characterized by unfailing promptness, courtesy and accuracy."

There follow brief instructions relating to promptness in answering calls, how to answer them, and inviting an avoidance of the word "hello." These and various other points are further elaborated in the "Employes' Hand Book" of the Commonwealth company, and the company's idea of the A B C of telephoning has been particularly indicated by an attachment to each telephone transmitter, to which I feel sure no telephone company will object, and upon which is printed, in large letters, the words "Accuracy, Brevity, Courtesy."

The New York Edison Co. has also provided comprehensively for communication from and to the public, having installed in its general offices a private branch exchange with 51 trunk lines and 267 telephone instruments. There are, in addition, 19 private branch exchanges in various offices of the company throughout the city, having 79 trunk lines and 378 telephones. The full telephone equipment of the New York company at the present time is 24 branch exchanges, 750 telephone extensions, 161 trunk lines, 66 tie lines, connecting various switchboards of the company, 446 miles of telephone circuits, 25 direct exchange lines, and a traffic running about 20,000 calls per day.

The 1911 edition of the company's pamphlet concerning telephone service states: "A large part of our business is now transacted over the telephone. The public deals with us by telephone—we deal with ourselves by telephone. The telephone is the chief means of communication between our many departments and employes scattered over the city. Our commodity, electric current, is distributed by a system that resembles train dispatching, done over a special telephone system. Now, as the telephone is so very important to us, and becoming more so each year, we want to develop it as actively and intelligently as any other department of the Edison Service."

Several pages of interesting and valuable suggestions in regard to the use of telephones follow this introduction. One interesting rule is to the effect that no patron who is answered by a representative of the company shall be "switched," even if he has been connected with the wrong department, the rule being that the call will be attended to as far as possible and completely taken care of by the person who answers, without switching from one department to another.

It would probably be just as difficult to find an electric light or power company without a telephone as to find a telephone exchange without electric light where it is possible to get it. This reciprocity may also be stated in terms of bills paid for service, and in this the two cities of New York and Chicago will be found to be fairly representative of the entire country. For the year 1912, the amount paid to the New York Edison Co. and the Commonwealth Edison Co. for service was $162,821. The amount paid by these companies for telephone service was $107,320.

The classes of customers of the two interests are very much alike, and the distributing plants for both services cover nearly the same areas. It is natural, therefore, that the relations between the two interests should each year become reciprocal to an increasing extent. Joint pole lines for the distribution of wires have come into more general use. Construction details for necessary crossings and for paralleling routes are now generally matters of agreement between engineers. Telephone companies are relying on your services increasingly each year for power and light, finding with the growing stability of the plants less of a requirement for duplication in the way of local installations.

For both services, lighting and telephone, so closely related and inter-dependent, I think it may be said that the officers in charge are endeavoring in the conduct of the business to serve the public efficiently in the spirit that they and all employes are directly accountable to the communities in which they operate, for good and dependable results. The appreciation of these conditions by the public is indicated in the continued growth of the business. Both interests have been constant in the endeavor to increase the efficiencies of plant and organization, and have made this possible by highly developed systems of communication, as a constant means of knowing what is going on and for the control of the services rendered.

Some one at some time put forth the undisputed maxim, "Knowledge is power." In connection with the value to your business of this knowledge of what is going on, which I have endeavored to demonstrate, it seems fair to stretch the old maxim a little, and to say, in this case, that knowledge is not only "power" but "light," also.

Practical Telephony for the Practical Exchange Manager

A Series of Articles Relating to the Construction, Maintenance and Operation of a Moderate Size Telephone Exchange, Which Began in the Issue of September 21, Expressed in Everyday Terms, Easily Understood—Principles Easily Applied

By H. R. Van Deventer

The cord circuit ringing and listening keys are subjected to constant wear and often receive considerable abuse, being torn apart for the location of troubles that exist elsewhere.

A typical key of a type furnished by the majority of makers is shown in Fig. 44. The wearing qualities of this type of key are excellent, provided care is taken to keep dust from lodging on the rubber insulation between the springs. The removal of dust is easily accomplished by use of a bellows or a fine brush.

The contact springs are fastened to the frame of the key by long screws which pass through rubber bushings. The construction of the key is clearly evident from Fig. 45, which shows the various parts. If dust or moisture gets into the keys or a ringing current of excessive voltage is used, or lightning comes in over the cord circuit while connected, the bushings, insulating screws, or the insulation between the springs, will be punctured and cause trouble.

This trouble is very elusive and manifests itself in several ways. One common manifestation is excessive cross talk. To locate this in the keys, merely unsolder the wires from the springs. Another trouble is generator noise. When two parties are talking, they hear the noise caused by the operation of the exchange generator. This is evidence of a leak a little less than the cross talk leak. It is located by unsoldering the wires from the keys.

If neglected, this trouble will become more severe and finally, when ringing on the calling cord, the current will often leak through the bushings and back on the answering cord, or it will jump about through the key, possibly getting over into the operator's set. The remedy is to change

the insulations *A* and *B* and the spring bushings *C* and *D*, Fig. 45.

Occasionally, the operator will receive mysterious shocks when she touches the key plates *E*. This is caused by a like defect in the insulation or by one of the springs coming

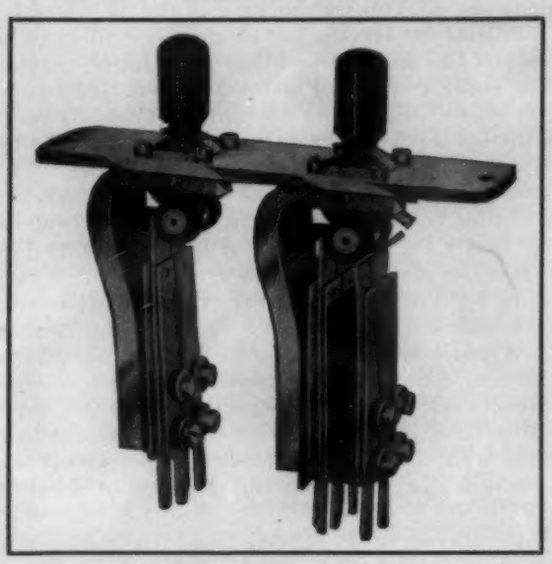


Fig. 44. Typical Ringing and Listening Key.

in contact with the frame *F* of the key. It is possible, however, for one of the rubber rollers *G* to wear so as to let the spring come in contact with the handle, although this seldom happens.

The stop pin *H* is provided for limiting the motion of the long springs on the ringing side of the key. It is a favorite amusement with some amateurs to break off these pins. To insure satisfactory operation, the pins must be in place. The stay pin *I* limits the throw of the key. This is correctly set by the manufacturer and bending of it to establish adjustment of the springs, should never be undertaken when the key is in the switchboard. The pin on which the key handle turns may be oiled occasionally with a most minute quantity of oil. Do not oil the rubber rollers or use so much oil that it will run down onto the key springs.

When sent out from the factory, the switchboard keys are so adjusted that the handles are upright and the little rollers are not in contact with either set of springs, or are only lightly in contact with them. In making adjustments

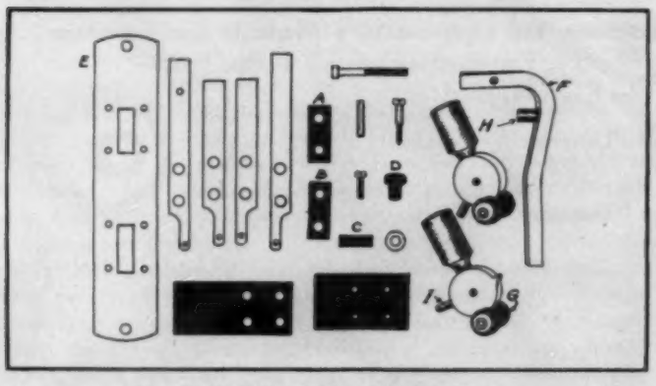


Fig. 45. Details of Key Construction.

this fact should be kept in mind and the long springs on which the rollers act should not be so bent that they come in contact with the rollers.

With modern keys contact trouble has practically disappeared as the manufacturers not only know how to cut the springs, in relation to the grain of the metal out of which they are made, but also employ special metal which will stand a great deal of bending and yet return to the initial position. The contact points proper are all riveted instead of being soldered as in the early days, and on the majority of keys platinum is used. By far the greater amount of key trouble is caused by someone tearing up the keys when the trouble is elsewhere, especially when looking for so-called bad contacts.

Many a key spring has been bent in an endeavor to cure a "bad contact" which existed, due to rosin, at the point where the wire was soldered to the key spring and not between the contact points proper.

In every exchange a plenteous supply of duplicate bushings, spring insulations and key springs should be kept on hand. Better yet, one or two extra keys should be provided so that when a key is in trouble it may be taken out of the board and a new key substituted. The bad key can then be returned to the factory for repair and adjustment.

(To be continued.)

Earnings of Kinlock Long Distance Telephone Co.

The Kinlock Long Distance Telephone Co., of St. Louis, Mo., has issued the following report of earnings for the year ending December 31, 1912, with a comparative statement for the preceding year:

	1912	1911
Gross earnings	$1,509,763	$1,448,273
Expenses and taxes	745,008	708,542
Net	$ 764,755	$ 739,731
Miscellaneous income	5,600	8,400
Totals	$ 759,155	$ 731,331
Bond interest	286,232	271,887
Balance	$ 472,923	$ 459,444
Depreciation reserve	181,243	180,000
Surplus	$ 291,680	$ 279,444

The company's dividends at the rate of 6 per cent. on $2,800,000 capital stock call for payment of $168,000 yearly.

Election of Officers of the A. I. E. E.

At the annual meeting of the American Institute of Electrical Engineers, held recently, the result of the election of officers was announced. The new officers whose terms begin August 1, 1913, are: President, C. O. Mailloux, New York; vice-presidents, H. H. Barnes, Jr., New York; J. A. Lighthipe, Los Angeles, Cal., and Charles E. Scribner, New York; managers, B. A. Behrend, Boston, Mass.; Peter Junkersfeld, Chicago, Ill.; H. A. Lardner, San Francisco, Cal., and Lewis T. Robinson, Schenectady, N. Y.; and treasurer, George A. Hamilton.

The board of directors for the administrative year beginning August 1, 1913, will, therefore, be composed of the nine officers mentioned above, together with 13 holdover members.

Telephone Talks in Waco, Texas.

With the purpose of calling the attention of its subscribers to the many ways in which they can co-operate with the company in maintaining better telephone service, the Brazos Valley Telephone & Telegraph Co. of Waco, Texas, has begun publication in the local papers of a series of "telephone talks." The first of these by General Superintendent P. Kerr Higgins invites the public to visit the operating rooms and offices of the company at designated hours at which time the company will be glad to explain how the system operates. A number of points on how to use the telephone are given as well as a discussion of telephone courtesy.

Proceedings Before Commissions, Courts and Councils

Discussions and Rulings of State Bodies Having Supervision of Telephone Companies, Decisions of Courts in Matters Affecting Public Relations of Utilities, and Actions of City Councils Bearing Upon Franchises, Rates and Service

New Jersey Commission Refuses Competing Franchise.

The New Jersey Public Utility Commissioners have withheld approval of an ordinance passed by the borough of Avalon, Cape May county, and another one passed by the Cape May County Board of Freeholders granting franchises to the Eastern Telephone & Telegraph Co. to erect a telephone line. Objection to the proposed franchise was made before the state commissioners by the Delaware & Atlantic (Bell) Telegraph & Telephone Co.

The request for the approval of the ordinances was made by the Eastern company. Two questions were involved in the application, namely: whether the commissioners, under the act of 1911, had power wholly to withhold their approval of the ordinances after they had been duly passed, and, secondly, whether competing telephone service, when permission therefor is accorded by ordinance, is necessary and proper for the public convenience and properly conserves the public interests.

Taking up the first point, the commissioners held that municipal permission is necessary for the location and construction of a local line or system, and then say, in part:

"Acquisition of the right to construct such a line is dependent upon obtaining such permission. Such permission, when granted, seems to us to involve the grant by a political subdivision of the state of a privilege or franchise to use of the public streets, and to fall within the provisions of the law of 1911 (the public utility act), making the approval of this board requisite to the validity of such a grant.

"If this board has, as it concludes, jurisdiction in the case, it is required to grant its approval only where it determines that the privilege or franchise is necessary and proper for the public convenience, and properly conserves the public interests, and in approving, upon such determination, it may impose such conditions as to construction, equipment, maintenance, service or operation as the public convenience and interests may reasonably require. Where it determines that the privilege or franchise is not necessary or is not proper for the public convenience or does not properly conserve the public interests, no obligation is imposed upon this board, nor is it within its power, to approve."

Passing to the question of competition, the board showed that the Eastern company is a part of the Keystone Independent system. Then it held that the proposed competitive telephone service is not necessary for public convenience and would not conserve public interests. The board restates its conviction that the state should compel competing telephone companies to afford physical connection for proper toll charges over their respective lines.

West Virginia Public Utility Act.

The act of the last legislature of West Virginia creating a public service commission goes into effect this month, says Electrical World, and it is expected that the governor will soon announce the names of the commissioners. There are to be four commissioners, whose terms of service will be eight years, and the salary attached to the office is $6,000. Telegraph and telephone companies are included under the jurisdiction of the commission as well as all persons, associations, corporations and agencies employed or engaged in any of the businesses enumerated in the act. The commission will also perform such duties as may be imposed upon it by law in connection with any workmen's compensation law or fund which may be established. It is empowered to change any intrastate rate, charge or toll which is unjust or unreasonable and may prescribe such rate, charge or toll as would be just or reasonable and change or prohibit any practice, device or method of service in order to prevent discrimination; provided that it shall not reduce any rate, toll or charge within ten years after the completion of the railroad or plant to be used in the public service below a point which would prevent such public service corporation from making a net earning of 8 per cent. on the cost of construction and equipment of such railroad or plant.

The commission is to collect full and complete information on the value of all property owned and controlled by a public service corporation once a year, and to furnish the same to the board of public works for use in assessing taxes. A new tax is laid on public-service corporations in the shape of a special license fee, the amount of which is to be apportioned to the value of the corporation's property, and the tax in the aggregate must produce a revenue of $60,000 a year, for the support of the commission. The orders of the commission are reviewable by the Supreme Court of Appeals.

Bill Passed by Illinois Senate.

Glackin's senate bill 289, giving cities except Chicago the right to regulate telephone rates has passed the Illinois senate by a vote of 26 to 0. The other Glackin bill, 292, giving the city of Chicago the same power has passed by a vote of 33 to 0. The senate has passed the Wage bill No. 539 which authorizes cities on a referendum vote to acquire and operate public utilities. The vote was 38 to 0.

Appeal in Pana, Ill., Case.

The Christian County Telephone Co. has taken an appeal in the case brought against it by the city of Pana, Ill., in which it was fined $1 for violating its franchise by charging higher rates than provided for in the grant. The company claims the subscribers agreed to the change and the circuit court will pass upon the matter.

Chicago Telephone Co. Accepts Rate Ordinance.

The directors of the Chicago Telephone Co., it is reported, have accepted the new telephone ordinance passed by the city council on May 26 and the terms of which were published in TELEPHONY of May 31.

Wisconsin Commission Orders Another Connection.

The Wisconsin Railroad Commission has directed the Ettrick Telephone Co., of Ettrick, Wis., and the La Crosse Telephone Co., of La Crosse, Wis., to make a physical connection of their lines so that the subscribers of both companies may communicate with each other from the stations installed in their houses and places of business, respectively. Each of the companies is to pay one-half of the expense of making such connection. This is the second decisions of the commission under the so-called physical connection law. The first decision applied to toll rates. The present decision applies to regular subscribers.

Lincoln Telephone Company Before Commission.

The Lincoln Telephone & Telegraph Co. recently appeared before the Nebraska State Railway Commission asking permission to issue $1,100,000 of special preferred 5 per cent. stock to be sold for 92 cents on the dollar,

the proceeds to be used to take up short time paper in the sum of $514,500 and long time notes to the amount of $40,000, to purchase other plants necessary to consolidate with the present system and to complete certain improvements already under way. Contract for the sale of the stock has already been made with eastern connections of the company and payment made of part of the purchase price.

President Frank Woods who represented the company before the commission is quoted as stating that unless the commission saw the justice of the request and granted its permission to issue the stock to meet expenditures not properly chargeable against income and for increases in rates, the citizens of the state were in grave danger of seeing the control of the company pass into the hands of the Bell company. The reason for this, as shown by President Woods, is that the special preferred stock taken by the Bell company in payment for its lines south of the Platte absorbed by the Independents, and the proposed issues are all non-voting, provided the corporation meets the obligations, such as payment of the interest. In the event that certain interest dates are passed and the money due on the stock is not forthcoming this stock becomes voting, and forthwith the control will pass back to the Bell company.

If the railway commission gives permission for the issue of the extra $1,100,000 the Bell corporation will then hold about $4,000,000 of the $6,000,000 of the corporation's outstanding stock and bonds.

The exchanges to be purchased by the company include those of the Hastings, Dewitt, and Filmore county Independent companies, the stock of which had been bought by President Woods in his own name for transfer to his company. The Lincoln company now owns the Bell exchange at Hastings and will consolidate it with the Independent exchange in that city.

Nebraska Commission Making Second Test of Service.

A second series of tests on the service being given telephone subscribers in Lincoln, Neb., and its environs by the Lincoln Telephone & Telegraph Co., has been started by the Nebraska State Railway Commission. The commission has employed a number of special assistants who art putting in their time calling up subscribers and asking about the service. The helpers used in the first test were students from the university law school.

The report made to the commission by the corps of investigators who conducted the first tests was that the service was nearly perfect. This was disputed by a number of patrons who appeared before the commission at a subsequent hearing.

Is Mutual Company in Kansas Subject to Commission?

John Dawson, attorney general of Kansas, has under consideration the question whether the Cherokee County Mutual Telephone Co. comes under the authority of the Kansas Public Utilities Commission, and if so, the largest mutual telephone company in the state may be forced out of business.

This company has more than 2,000 subscribers nearly all of whom are farmers, and it is not operated on a profit making basis. Each subscriber is assessed the sum of $2.00 per year, and this is used to pay the cost of maintaining the switchboard and lines. The farmers must maintain the short lines from the main trunks and own their own instruments.

People in the vicinity of Baxter Springs filed a complaint with the utilities commission recently when the Cherokee Mutual company announced that the lines would be extended to Baxter Springs and connect with the local exchange there. It is reported that the members of the utilities commission said that the mutual company would be required to meet the obligations of all corporations operating exchanges and install a better grade of equipment, including poles and wire, and to establish a schedule of rates for long distance calls as fixed by the commission according to the requirements of all private ownership companies.

David Dunbar, president of the mutual company, has conferred with the state officers and declares that such action would force the people out of business. The mutual company was organized two years ago. The company started with two lines, but now has 120 lines, which are eight miles long.

Proposed Independent Consolidation in Oklahoma.

Options have been given by the owners of a large number of Independent telephone exchanges in southwestern Oklahoma to a new syndicate to be known as the Consolidated Independent Co., which will include a score or more of such exchanges. If the new company's plan to secure exchanges in twenty-one towns matures, it will be operated as a rival to the Pioneer Telephone & Telegraph Co. in that part of the state and will construct toll lines to connect up all of the towns in its system. Among the plants included are those at Frederick, Mangum, Temple, Tipton, Lone Wolf, Clinton, Cordell, Tuttle and Martha.

Oklahoma Commission Fixes Rates.

The Oklahoma Corporation Commission has denied the application of C. E. Devin, owner of the telephone exchange at Apache, for permission to raise telephone rates. The commission adjusted some discriminations which were alleged to exist and fixed what it considers a reasonable rate for service.

It is pointed out by the commission in its order that the exchange had charged different rates to different subscribers and the whole matter was settled by an order establishing uniform rates.

Ruling by Public Service Commission of Missouri.

The Public Service Commission of Missouri has ruled that telephone companies can neither directly nor indirectly give rebates or collect or receive from any person or firm more or less compensation for any service rendered with respect to communications that is charged or received for contemporaneous service. Telephone companies cannot furnish free, even for public service, a telephone in a railroad depot or office.

Rulings of Missouri Commission.

The Missouri Public Service Commission has ruled that the telephone companies cannot furnish free telephones to railroad stations for the accommodation of the public. The commission also holds that intra-state transportation can be issued to newspapers in exchange for advertising.

Rate Reduction in New York.

Under a ruling of the Public Service Commission of New York, Second District, a five-cent telephone rate became effective on June 1 from Bath Beach, Coney Island, Bay Ridge, Midwood and Canarsie to the territory south of 110th street, Manhattan, with a 10-cent rate for all territory now above 59th street including the Bronx, Melrose and Tremont. After rendering its findings the commission began a general investigation of toll rates throughout the city.

Resignation of John S. Kennedy.

John S. Kennedy, who has been the secretary of the Public Service Commission of New York, Second District, since its creation, and prior to that secretary of the old state railroad commission, has resigned to accept an executive position with the New York Telephone Co., with headquarters at New York city.

Practical Subjects—Letters and Discussions

Some Kinks from Kansas.

An idea set forth will often be of great interest to telephone subscribers and manufacturers. The sketch shows a library table in which a magneto set and a hand micro-phone may be

Table for Hand Set Use.

placed. By raising the lid, the hand set may be taken out and when through talking instantly replaced.

Subscribers will purchase the table or pay a reasonable advance in rental.

Wishing an easy way to attach a wire to a ground rod, I took a Fahnstock clip off of some dry cells, together with the screw. The screw was run through the clip and through a hole in ground rod. Screwing it tight and riveting makes a handy, quickly attached and satisfactory ground clip. I have used them satisfactorily.

Kansas. C. R.

Letters from a Retired Lineman to His Nephew.

Podunk Valley Farm.

Dear Ben:

I cannot describe the catastrophe to Podunk better than to quote the head lines from the Banner, issued on a sale-bill sheet two days after the fire.

"Podunk Visited by Fire. A Band of Wild Horses Racing Through the Street; A Troop of Wilder Men dealing Demolition and Destroying Everything in Their Path." Doc Stuver says that tells the story. Sounds like a Mexican revolution, doesn't it?

It happened that I was out on the line that morning, but Doc has told me most of the details. It was about six o'clock in the morning when the fire was discovered in the Opera House block. It had been raining "some considerable" for a week and the streets were lakes of mud and slush about two feet deep. The first company rushed for the chemical engine, and in their haste started up the street with it, rear end first. After going about two blocks, a nut worked off from one of the axles, the wheel came off and the machine went down. One of the valves broke with the fall, and the tank emptied itself then and there.

Doc says that in an hour three hundred men were on hand to assist the fire in its work. He doesn't know which caused the most damage. Here are some of the fool stunts they pulled off.

Broke in a plate glass window, although the double doors had been wrenched from their hinges.

Rolled the jeweler's fireproof safe across the sidewalk and tipped it off into the mud, where it lies today.

Carried a large mirror from the barber shop, across the street and slammed it against a fence with dire results.

Threw a dozen baskets of crockery from the banquet hall window, second floor, and carried several more baskets of unbreakable articles, cutlery, kitchen stuff, etc., downstairs and through the mud to safety.

Carried two or three armloads of fancy shirting from a broken show case, half a block up the street, down an alley and dumped them into a pig pen. Doc says the hogs were delighted and rooted around with great energy, grunting their thanks.

Sam Riley has an open well with an "old oaken bucket" and windlass. There are four baskets full of miscellaneous smoking tobacco and soap with some canned goods stored in the well for safety.

Some idiot went into a cellar, broke open a barrel of kerosene oil, to prevent an explosion it is presumed. Doc says "some other fool" promptly set fire to it, which stopped all interior operations as there was supposed to be more oil in the same place.

To prevent the spreading of the flames, all the wooden sidewalks and fences were demolished for three blocks each way. Bill Skyle's smoke house found its way down to the creek—a quarter of a mile from the fire.

Then someone thought of the 97 wild broncos confined in the stockyards, in no danger at all. Anyway the gates were thrown open and the horses stampeded down the street. Eight of them are still roaming.

Doc says that "when the Almighty gets ready to destroy this planet, it will only be necessary for Him to give Podunk a day's notice," and Editor Skinner adds, "that He'd better keep a sharp lookout, or it may happen ahead of time."

Still harping about anchors, are you? Now I'll give you my idea of the patent anchors, and I believe that telephone engineers will, in general, agree with me.

For light lines, such as our line here at Podunk, or lines carrying even as many as six wires, they are satisfactory. In addition they are labor saving devices. In such cases the same factor of safety is not on heavy trunk lines.

There is an element of uncertainty about patent anchors, and though it may be small, it must necessarily be avoided in heavy building. Such lines are to important to take an unseen chance.

In the first place when the driven anchor disappears in the ground there is no way of knowing what condition it is in when it reaches its proper depth. I will grant that in a vast majority of cases, it is just as it is designed to be, but that minority case is the one that is considered in building a trunk line.

Another thing; the holding surface or anchorage is very small compared to the standard of the old reliable log or later design of planks laid crosswise. To secure an equal surface would require several of any style of patent anchors. Take a right angle corner of a 60 or an 80-wire line. Not less than three anchors are required on each of the two poles. It is not always an easy matter to get proper clearances for the wires in carrying the guys to the pole.

Another point; there is no way of testing the holding power of any anchor. The test made with rope and blocks is nothing as compared to a line strain. I doubt if you can take three-sheave blocks and pull an ordinary one-inch ground rod out of the ground. How long would it hold a line strain?

I'm in favor of patent anchors for light lines, and shall use them if we do any more building here. But in the line of work you are in, you can build as strong as you can and then some and your line will not be too strong.

Don't think I am joking when I say I invested your last money in goats. Rats slowly on the decrease—cats on the increase. Your Uncle Dick.

Varied Experiences and Observations.

In a recent issue of TELEPHONY a question was asked concerning the advantages of connecting condensers in series with bridging ringers. The reply was to the effect that no material advantage was to be gained. If condensers could be used successfully in the ringer circuits on bridging farm lines, it would greatly simplify the locating of trouble with a volt-meter or ohmmeter. Trouble would show up at once by a voltmeter test, where with bridged ringers alone, a resistance cross is sometimes difficult to detect.

In the May 10 installment of "The Telephone Inspector and the Troubleman," a few remarks are made about soldered connections. About three weeks ago I located opens on two toll lines where iron duplex wire had been used for jumpers, connecting with the copper wire at a corner. The connections were imbedded in flux with some solder on the outside.

Apparently some linemen do not know how to solder even now when the results of poor soldering are known to nearly every plant man. The connections I speak of were not more than two months old. They would have been better off with no solder, but a wrapped connection without solder or sleeves is sure to give trouble in time.

Speaking of poor connections: while making up a sleeve connection in a copper wire that was black from exposure, I stopped to scrape the wires. A wire chief standing near remarked that I was too particular. But there certainly is very poor chance of any talk getting through the corrosion that is found on any copper which has been exposed for a number of years.

When testing trunk lines it is sometimes desirable to have an operator at the next station to short circuit the line. If the cord circuits have single bridged clearing-out signals, it is very easy to have the operator "short" the line by holding the tip of the calling plug against the sleeve of the answering plug, which is already in the jack she answers on. If any other clearing-out system is used and dummy cords are provided for test purposes, they can make the test with the dummies.

Two cases of "don't transmit" trouble, I located in the battery wire in the battery box. These wires are furnished in longer lengths than are actually needed to connect the dry cells and the extra length has to be pushed in somewhere. It frequently gets pushed back against the sides of the dry cells. When the cells become eaten through at a spot where the battery wire rests, the wire is corroded and breaks, even though insulated by sleeving, thus leaving the transmitter circuit open.

While driving along the lines of a neighboring exchange, I noticed a row of knobs on a pole line. The case looked very simple, the lineman had evidently run out of brackets and was forced to use knobs on this spur. But upon closer inspection I found my conclusions all wrong. The wires were clamped against the poles by screwing the knobs up. The lineman had evidently run out of tie wires instead of brackets. At any rate, the type of construction showed ingenuity, even if it were poor telephone construction.

York, Neb. Rufus Comstock.

A Good Way to Locate Trouble in Multiple Jacks.

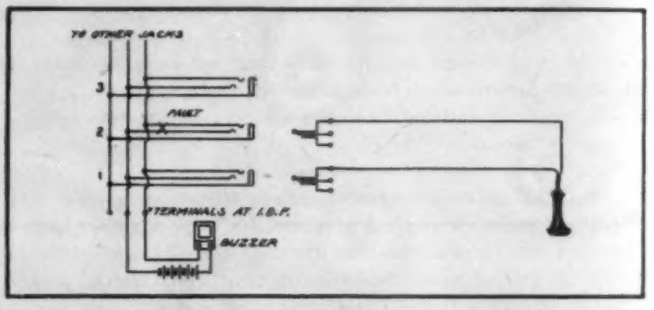
Trouble in multiple jacks is usually caused by the soldered tips being bent together, a piece of solder getting between the clips, a faulty bushing, or a small piece of metal spanning the bushing. Sometimes this forms carbon and makes a high resistance cross or what we term a "spooky" one, one that comes and goes.

The idea is to locate the jack the trouble is in by such a method so that it will only be necessary to take out one jack. The method described, with a little variation and judgment, gets them all.

Connect a buzzer, as in the sketch, across the terminals at the intermediate distributing frame so as to cause the buzzer circuit to be complete through the fault. If the resistance of the fault is too high to buzz through, place the generator across it through a 16 candlepower lamp and burn the trouble in, or use more battery on the buzzer. Sometimes the generator burns the trouble out and it will stay out. If it comes back, go to it again. Use the generator as a last resort.

An extremely low wound receiver with its terminals connected to the tip strands of two tinsel cords may be used, as shown in the drawing. Start with the first two jacks and a tone will be heard in the receiver until the faulty jack is passed. As shown in diagram, if the fault were in jack No. 2, the tone would be heard with the plugs in jack No. 1 and jack No. 2. But if the plugs be put in jack No. 2 and jack No. 3, the tone would not be heard, because the receiver then would be on a part of the wire through which no current would flow.

I have read of numerous ways of locating this kind of trouble, but it involves either a Wheatstone bridge, a galvanometer, or a lot of work. The material I use for this work costs very little. A low wound receiver should not cost over $3.50 and a buzzer, cords and dry cells can be found around any exchange.



Arrangement for Locating Multiple Trouble.

It takes only a few moments to get ready for the test and the faulty jack is very easily and quickly located. Tinsel cords should be used, as their resistance is lower than steel cords, or, if small lamp cord is used, the efficiency is increased.

Whenever the sleeve wire is involved in the trouble, always put the receiver terminals on the sleeve strands of the tinsel cords, as the sleeve strands are always of lower resistance.

The buzzer should be adjusted loosely so it will buzz through a high resistance. It is not necessary that the buzzer produce a good buzz, but should be adjusted so as to just open and close the circuit.

The receiver I use for this purpose was obtained from Stewart Bros.

Ottawa, Ill. Wire Chief, United Telephone Co.

All On Account of Dan Cupid.

The troubles of the Inter-State Independent Telephone & Telegraph Co. at Aurora, Ill., in keeping the ranks of its telephone operators filled have come to such a state that according to General Manager Griffitts "the only solution will be to quit hiring good looking girls such as we have. Those we have are too angelic in disposition and they also know how to cook. Their voices, like silver bells, echo over the wires, and in the spring when a young man's fancy is supposed to lightly turn to thoughts of love, our troubles begin."

There Was Once A Man

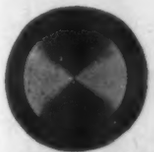
who started out to see how far he could make a dollar go, but—he had a hole in his pocket.

That's not the only way to let a dollar get away either—you can lose a lot of them by buying No. 10 copper wire, instead of No. 12 Copper Clad Steel.

The Copper Clad will give your subscribers just as good talk in the summer and a whole lot better talk in the winter, because it takes twice the sleet to break it.

If you have a hole in *your* pocket, put two dollars in the bank and send a check for one of them for—

No. 12 Copper Clad Steel Wire.



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Because it automatically seals up if punctured by a lightning discharge or high tension current.

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The fighting equipment of the **Marvelously Successful Bulgarian Army** is well known to be of the highest type and of the most efficient character, and the same high efficiency has been insisted upon for their field telephones. **The whole of the field telephones of the Bulgarian Army are fitted with MANSBRIDGE CONDENSERS.** There is no condenser in existence which will stand the same severe service conditions.

They have been adopted exclusively by the English government Telegraph and Telephone Administrations; and they are made under license by Western Electric Company, Ericsson Mfg. Co., Electric Specialty Co., Stromberg-Carlson Co., American Electric Co., and by numerous other licensees all over the world.

Insist upon having MANSBRIDGE CONDENSERS and save money in first cost, and also in maintenance.

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Door Open

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(Patent Pending)

MAINTENANCE: The "Folding Door" does not require the use of tracks in the floor, and, consequently, eliminates the main item of trouble experienced with the booths equipped with sliding doors. This is one of the many advantages of the "Folding Door" booth.

Write for booklet describing the advantages of the "Folding Door" Booth

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An Argument Against Commission Control of Telephones

Their Necessity as Safeguards Against Monopoly Denied—Matter of Service and Rates Will Automatically Adjust Themselves Because Managers Know Limit to Which They May Safely Go—"Value of Service" Theory Contrasted With "Cost of Service"

By Paul B. Findley

I am very much concerned to see the gradual weakening of telephone men throughout the country before the popular clamor for commission control of their business. The former position of the telephone business was the correct one, but, due to the failure of many managers to realize upon how sure an economic foundation they were building, they have become almost ready to exchange it for another which is literally founded upon sand. It is with the hope of calling the attention of thoughtful men to the direction in which we are drifting that I wish to point out some of the more salient facts.

The Two Theories of Telephone Rates.

The issue is now squarely joined between the advocates of the two theories of telephone rates. These are the "value of service" theory and the "cost of service" theory. The former, which is the older, hold that any service should be compensated on the basis of its value to the recipient; the latter believe that a service should be compensated on the basis of its cost to the supplier.

Historically, the "value of service" theory is the one under which all business has been done since prehistoric times. When a service is offered, the purchaser weighs in mind its usefulness to him against its cost to him; if usefulness appears the greater he accepts, otherwise he refuses. This applies equally to the purchase of commodities. If the small boy's nickel appears less desirable than the bag of peanuts which the vendor offers him he buys the peanuts, and gives no thought to the cost of the peanuts to the vendor.

With the development of the country and of large supplies of ready money, it became easier for Yankee ingenuity to effect large combinations of business, but there was nothing new in this, for monopolies are recorded in the very earliest times. We are not concerned with these artificial monopolies as much as with the natural monopoly of the telephone business. I am aware that in calling telephony a natural monopoly I may rouse the ire of some of Telephony's readers, but if we limit ourselves to the local exchange service, and assume just and equitable commercial conditions, I think that they will agree that one company will serve the community better than two.

With the growth in size and number of all sorts of monopolies step by step with the rising cost of their products, the public has looked on them with suspicion and hatred, not unmixed with fear. Seeing no limit to which a telephone monopoly *could* not raise its rates, they have imagined there was no limit to which it *would* not raise them. To prevent this they have rushed to their legislative soothsayers and ordered them to produce a spell against this horrid demon which was about to grasp them by the throats. The result of this spell has been legislative interference by bodies high and low, so that most companies are now begging for mercy and a relief from that common panacea of the American people, legislation.

A little thought, however, should convince any but the most prejudiced that these fears are groundless. In the first place, telephone men are quite human, and are peculiarly amenable to the pressure of public opinion. Further, any raise in rates is bound to cause dissatisfaction. In point of fact, with increasing rates the business will fall off in such a manner that the product, business multiplied by rates equals gross income, will reach a maximum and then fall off rapidly. Most companies are operating on the ascending part of the curve—i. e., their rates might be raised with an increase in gross income. It is quite possible for any manager to draw a curve showing this relation, its accuracy being dependent on his ability to judge the public temper.

In considering the amount of business to be secured, it must be borne in mind that there are substitutes for the telephone as well as for every other service and commodity. On the continent the mail and telegraph are used for city business, as well as messenger service, and a great number of telephone messages might be omitted without detriment to business. If a telephone monopoly made itself thoroughly disliked by its patrons, these remedies might be applied very quickly against it.

Any solicitor can testify to the difficulty of persuading a dissatisfied subscriber not to throw out his telephone. If general dissatisfaction exists by reason of unfair treatment, poor service or high rates, the company will lose money from cancellations instead of moves, unpaid bills, refusals to supersede to a better grade of service when the subscriber's business warrants it and the use of toll service as little as possible. This is loss of revenue which the company might just as well have had and it does not require a public utilities commission to convince a competent manager of this fact.

Possibly the best argument for the "value of service" theory is that the public will take and keep service only on this basis. Suppose a telephone is worth $50 per year to a business man. All the rulings and orders in the world to the effect that it costs $60 to furnish the service will not make him keep the telephone if the rate is raised to $60. Of course, if the service is offered for $40, no one expects him to insist upon paying $50, but it is certainly going too far for him to kick because in some other town they get service of a sort for $30.

Tendency of "Value of Service" Theory.

The tendency of the "value of service" theory is to charge as much as possible—with a very definite limit of what the public can afford to pay; the tendency of the "cost of service" is to pay as little as possible, with the indefinite limit of the least possible return to the investor which will satisfy him.

According to the new theory, the decision as to this rests with a body which is not responsible to those whose property it affects. The public is saying to the investor, "You may put your money in if you wish; we will not guarantee you anything, but will reserve to *our* representatives the right to interfere with your business, to prescribe your methods, to determine your rates, to dictate your policy. If you lose your money, why, that would be a pity, nothing more."

What the public cannot see is that it and the investor are one and the same and that any injury done to the investor is a direct injury to the public.

In regulating rates, a commission has to determine the minimum rates. What is to be included in the term "investment"? Shall it include the intangible capital of organ-

ization, good will, etc., which have cost the company years of work to build up? If so, how shall these be figured? What are proper operating charges? How shall obsolescence be provided for? Shall the plant value be taken at its first cost, or at its depreciated value? How shall economies be encouraged? The impossibility of giving a satisfactory answer to these questions, the hair-splitting decisions involved, and the complexity of the problems, point the absurdity of the whole situation.

As in most cases it is a good rule to take the simpler of two alternatives. Here it certainly is the "value of service" theory, with its avoidance of all these fine spun technicalities.

In conclusion, it seems to me that there are some grave dangers before the country as a whole of which those of the telephone business are a part. The efficiencies possible with the elimination of competition are too important to be passed by. In spite of court decisions, monopolies will soon be the order of the day.

If the public will let them alone, the present abuses will right themselves by the automatic eliminations of the offenders. If, however, the public persists in tinkering with business, especially the public service companies, we will have the ever-present danger of misguided, irresponsible commissions exercising control over the savings of hosts of small investors. If the confidence of investors is once lost, our financing must be done by the government with the resultant stagnation of government ownership.

The Telephone Inspector and the Troubleman

Continuation of a Series of Articles Begun in the September 7 Issue of Telephony—They Deal in an Elementary and Explicit Manner With Many of the Problems Encountered by Telephone Men in the Operation of Small Exchanges

By A. E. Dobbs

More Common Return Questions.

"It seems to me," said the superintendent to Will one day as he glanced over some letters of inquiry, "that a man could write a book on the subject of the common return wire.

"Some of my friends seem to have the idea that I consider a common return system as good as an isolated metallic circuit. If they will think over carefully what I have said, they will realize that I spoke of the metallic circuit as an ideal system and the common return as the next best thing.

"While it is true that the common return is a form of metallic circuit itself, compound metallic, in fact, yet it is not possible to obtain the perfect balance and isolation that goes with a simple metallic circuit. This is partly for the reason that the insulation of the common return will not be equal to that of the line wire, but more on account of the fact that, being a larger wire and covering more territory, its inductive and leakage disturbances are greater. Thus we have one side of a circuit that will not balance with the other. This tends to make a noisy telephone line, although in an exchange where all the lines are short, it would not be pronounced enough to be objectionable.

"In order to understand just what I mean, take a look at this drawing (Fig. 78), which represents the conditions found in a common return system. Here we have two lines connected together, whose combined resistance on one side is 100 ohms. On the other side they are connected to the common return wire, which, however, is of only 4 ohms resistance. Thus, we have a circuit with a resistance of 100 ohms in one leg and 4 ohms in the other, which tends to cause an unbalanced condition. As the total resistance of the circuit is 104 ohms, its center would be at a point

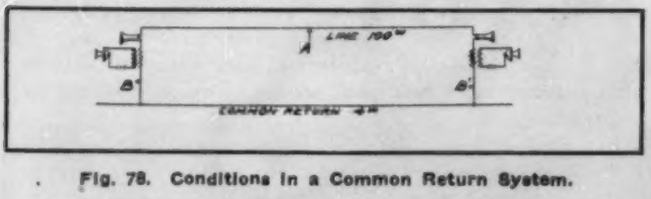


Fig. 78. Conditions in a Common Return System.

where there would be 52 ohms on a side. In this case it would be somewhere near the point marked 'A,' that the receiver would become quiet, but, unfortunately, the instrument could not be moved to that point. In short lines of that length, however, the difference is not so marked as you might suppose. But if the resistance of the upper line should be equal to 500 ohms and the lower one to about 40 ohms, the difference would be more marked, and conversation would be next to impossible. In this case (Fig. 78) we must consider that the induction coils and receivers would probably have a resistance of 300 ohms at each end, 225 for the coil and 75 for the receiver, making 600 ohms in all, so that the difference in resistance of 96 ohms between the two sides would make a comparatively small percentage of difference."

Ground Resistance Discussed.

"Why not increase the resistance of the return side?" interrupted the manager, who had come into the room just after George started talking to Will.

"That would induce cross talk, because the resistance between the instruments and the exchange would throw too much current into the other lines."

"I don't mean that," exclaimed Mr. Risk. "I mean why could you not insert resistance between the instrument and the common return wire at these points (*B B'*) to balance the resistance of the line? You have a difference between the line and common return of 96 ohms. Now could you not strike a balance by inserting a resistance of 48 ohms next to each instrument on the return side?"

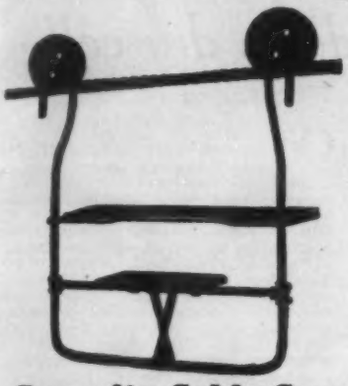
"That would, undoubtedly, help matters and bring about a condition nearer that of a metallic circuit," answered George. "This idea of yours also partly explains why some grounded lines are better than some others with a common return, as the resistance of the earth connection will range from 50 to 500 ohms or even higher."

"What! Will a water pipe connection run as high as that?"

"The theoretical resistance of a ½-inch water pipe is about 1.6 ohms per mile, about the same as No. 5 copper wire, but as every joint in it, and there are joints every 10 or 15 feet, is probably filled with white lead and oil, which is a pretty fair insulator, it will be found much higher. This is especially so when the cast iron mains are reached, the joints of which, being calked with tar and oakum, reduce their electrical carrying capacity to that of the water on the inside.

"This is proved by the experience of street railway men, who sometimes find a difference of 50 volts or more between different sections of the same water pipe. Between

Security Practical Line Specialties



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Rigidity—strength—lightness—handiness — *and absolute safety* —make this a most efficient car. The Security Car is tested to 1000 lbs. before it leaves our shops, and will not break down under a ton. You can trust your lineman to the Security Car with an easy conscience.

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Literature and prices of Security Specialties on request. Ask for Booklet Six.

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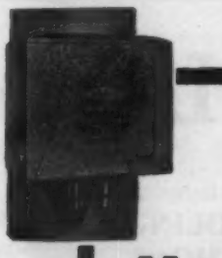

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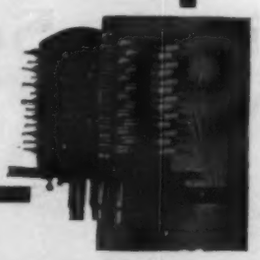

Why Telephone Companies Adopt The "Vac-M" Lightning Arrester

It cannot become grounded.

It causes no expense or trouble.

It protects the line all the time, under all conditions of service.

It is the best arrester investment a company can make.

The initial cost is reasonable.

It costs next to nothing to maintain.

Listed among the devices approved by The National Board of Fire Underwriters.

If you want to know more about it—what the companies that use it think of it, and why they think so, write to

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A step beyond the dry cell

WE have told you that our cells do not deteriorate while the circuit is open and we have quoted authoritative tests to prove it. Must we show you similar tests by the War and Navy Departments, the large clock companies and other people? We would rather not spend the time in piling up evidence on that point.

We have told you also that the current content is two or three times that of the best dry cells, and we have referred to the tests of the Electrical Testing Laboratories to prove that. There is no better laboratory test to be had anywhere.

OF course we are glad to show you how this combination of high capacity plus non-deterioration has worked out under service conditions during the last five years; how this man ran his Klaxon horn four seasons and into a fifth on a set of six (he bought in April, 1909, and renewed last Saturday, May 31st); how that man ran a four-cylinder Elmore car fourteen thousand miles on a set without other ignition; how other users, large and small, have run elevator bells, factory telephone plants, electric clocks, side lights, wagon lights, garage and barn lights on single sets for two or three years; how our coast defense guns are fired by the Burn Boston; how the Navy uses it, and so on.

But what we are talking about now is telephony

The things that cost are inspection and the actual time spent in making replacements. Look at your own costs and see.

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The galvanizing itself is the best development of an experience of more than half a century.

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water and gas pipes, which parallel each other for many thousands of feet in the earth, potential differences will sometimes be found great enough to ring door bells, light incandescent lamps, or even, as in one case I have heard of, light an arc lamp. It is also on record that lightning has unjointed several lengths of water pipe buried in the ground, thus indicating considerable resistance at the joints.

"When I did bell work and annunciator wiring, I generally, although not always, found that it was cheaper and more satisfactory to run a wire return, even to distances of 1,000 feet, than to buy extra batteries to overcome the resistance of a gas or water pipe return.

"But we are getting away from the subject," recollected George. "As I said before, the return covers a larger territory, and, hence, we can not maintain for it the insulation of a single wire. Therefore, as in the case of a metallic circuit when one side is grounded, it is more or less noisy. Why is it? Well, there are several reasons, the principal one being that the leak throws earth currents on one side of the line, while the other is free from them, and the disturbing currents, in trying to equalize matters and reach both sides of the circuit must pass through the instruments. In long lines the static induction will also be greater on the return side than on the other. With an insulated and properly transposed metallic circuit, both sides are equally affected by the earth induction. The effect is thus neutralized, but a child can see that a ground on one side would upset this balance. It is the same way with a return wire, although as I said before, this is not very troublesome on short lines. But you should not connect any toll lines with this common return system except through a repeating coil."

"What is your opinion about grounding the return wire?" asked Mr. Risk.

"That depends entirely upon circumstances," answered George. "With the return wire as carefully insulated as the rest of the system, it would seem theoretically better not to ground it; but as a general thing it is not so. Constant leakages at other points will often make a ground at the office more or less necessary. One advantage of a grounded return is, that in a cross with high tension currents, all the damage will be confined to one line, whereas with an insulated system it may spread. On the other hand, it may be argued that in an insulated system a cross of that kind is not apt to do any harm even if the lightning arresters don't catch it, as the noise would be instant notification of the trouble."

(To be continued.)

Albany Firemen Object to Location of Anchor Cables.

Commissioner Erving, of the department of public safety of the city of Albany, N. Y., has asked the officials of the New York Telephone Co. by what authority they have strung anchor cables from their poles to within a short distance of the ground in several sections of the city.

At a recent fire some of the firemen fell over these cables which they did not see in the dark where they were working and were more or less injured. Unless the company can show that it has authority for the stringing of the cables the commissioner will order their removal.

May Meeting of A. I. E. E. Directors.

At the regular monthly meeting of the board of directors of the American Institute of Electrical Engineers in May, a resolution of thanks was adopted in recognition of the services rendered to the Institute by Edwin Plimpton Adams, professor of physics, Princeton University, through his admirable presentation of the lectures on radioactivity, delivered at the Engineering Societies Building, New York, during the latter part of March and early in April.

F. L. Hutchinson was unanimously reappointed secretary of the Institute for the administrative year beginning August 1, 1913, in accordance with the constitutional provision that the secretary shall be appointed at the board of directors' first meeting of each fiscal year.

The annual report of the board of directors was approved as were also the annual reports of all committees.

Announcement was made of the death of Horatio A. Foster, a past-officer of the Institute, and a member of long standing. The board voted to incorporate in its records an expression of appreciation of his personal services and hearty co-operation in the formative period of the Institute.

Meeting of Western Ontario Independents.

The Western Ontario Independent Telephone Association held its annual meeting at London, Ont., on June 3, with representatives of about 20,000 Independent telephone subscribers present. Francis Dagger, secretary and treasurer of the Canadian Independent Telephone Association, gave an address on "Legislation," and F. S. Scott, president of the Brussels, Morris & Grey Telephone Co., gave an address on "Compulsory Bell Long Distance Connection."

Resolutions were passed authorizing action to be taken with a view to securing legislation enabling the Dominion Railway Board to order connection with the Bell local exchanges at points where the board ordered long distance connection with competing companies; also, that in cases where the interests of companies holding provincial charters and the Bell telephone company were involved that the matters in dispute should be heard by a joint board comprising members of the Dominion Railway Board and the Ontario Railway Municipal Board who should have power to hear the case and have authority to decide the points at issue.

Myron A. Gee of the Erie Telephone Co. was appointed president and Dr. W. Doan of the Harriettsville Telephone Association, secretary and treasurer, for the ensuing year. The next annual meeting will be held on June 3, 1914, at Aylmer, Ont.

Telephone Service and Exhibit at Panama Exposition.

Thirty operators working at one telephone switchboard, connecting with 2,000 stations, is the very attractive exhibit which will be installed by the Pacific Telephone & Telegraph Co. at the Panama-Pacific International Exposition at San Francisco in 1915 to celebrate the completion of the Panama Canal. The switchboard will serve as the central telephone exchange for the entire exposition grounds, and will at the same time prove one of the most interesting exhibits of "Electrical Methods of Communication" in the Palace of Liberal Arts.

A novelty in connection with the installation which has not been introduced before in exposition stations is that the whole plant will be enclosed in a huge glass case, so that visitors to the exposition may see exactly how a call is made, received, and transmitted to the party called. The handling of local and long distance calls may be watched by the visitor, who will be shown through the installation by competent guides provided by the company.

The three main sections of the exposition, the exhibit palaces and gardens, the section for states and foreign nations special pavilions, and the section for amusement concessions will be connected as would different districts of a large city.

The telephone company will pay the exposition a commission for the franchise and the whole system will be conducted as a concession. At various points in the grounds and in every exhibit palace, there will be public booths for intercommunication use and outside connections.

Transmission the Foundation of Good Telephone Service

The Qualities of Transmission and the Standards Used for Comparison Purposes—Classification of Losses in Telephone Circuits Which Affect Transmission—Paper Presented at Annual Convention of National Association by Member of Telephone Service Association

By Albert L. Staderman

The purpose of the telephone is the transmission of speech, or, to be more exact, the reproduction of speech by electrical means; in other words, the conversion of sound waves into electrical waves, and the re-conversion of electric waves into sound waves, this process being known as transmission. It is apparent that the subject of transmission is of very great importance to the telephone business. It is the very foundation of good telephone service, for without good transmission the traffic and commercial departments of a telephone company are helpless to serve the public.

The problems of transmission are not serious for entirely local systems or short toll lines, but they become very serious when transmission over a great distance is attempted, for then the losses approach the limit of transmission. As a long distance call may originate at any time from any telephone, there are few entirely local systems, and therefore transmission is important for all telephone systems, if the public is to get adequate service.

Problems of Transmission.

The subject of transmission was not important to Independent telephony until real long distance talking was attempted. The Independents have developed the local field and the short haul toll field. There still remains the problem of giving service over circuits usually classed as long haul long distance.

In the early days any kind of circuit or equipment would give satisfactory service, as the limit of transmission had not been reached; but as the public is now demanding long haul long distance service from the Independent companies, it becomes necessary for them to consider seriously the subject of transmission losses.

One difficulty about the subject of transmission is the fact that it can not be measured as readily and simply as are every day electric currents by means of instruments in common use. Hence transmission measurements are not made as often as they should be. In order to measure the transmission equivalent or losses of any circuit, an arbitrary standard circuit is most generally used, against which the unknown transmission is compared. The standard artificial line is so adjusted as to balance the actual line under test, so that no difference will be noted when rapidly switching from the actual to the artificial line. When this balance is obtained, the transmission equivalent of the unknown line is obtained by noting the amount of artificial line inserted.

The unit of this artificial line consists of a mile of a standard cable arbitrarily chosen, and which has the following properties: mutual capacity, .054 microfarad per mile; loop resistance, 88 ohms per mile; and inductance and leakage negligible. This corresponds to No. 19 B. & S. gage, paper insulated cable such as was in common use up to a few years ago for local service before No. 22 B. & S. gage cable was developed.

In comparing the qualities of transmission of one circuit to another, the different circuits are expressed as having a transmission, equivalent to a given number of miles of standard cable. Thus, an 18-mile standard means transmission equal to talking through 18 miles of standard cable, using standard terminal equipment. In other words, standard No. 19 B. & S. gage cable is used as a yard stick, so to speak, in measuring transmission losses or equivalents.

Transmission has two qualities, namely, volume and articulation. Two circuits may have the same transmission equivalent in regard to volume, but may not be so as regards articulation, as articulation is difficult to compare.

The standards of transmission generally used in telephone work vary from about 18 miles of standard cable for local service up to a limit of 30 miles of standard cable for long haul long distance service. This does not mean that one could talk through the equivalent of 30 miles of cable with any kind of terminal equipment and obtain this limit, but means the sum total of the losses of substation, central office, and line losses should not total more than 30 miles.

As there are but 30 units of transmission loss to be used, if a large number of these are lost in the subscriber's instrument and the central office switchboard, there remain proportionately less to lose on the line, which means that the wire of the line has to be better to make up for losses in equipment. As there always will be terminal losses, it is very necessary to allow for these in designing the line.

The absolute limit of transmission varies from 40 to 60 miles of standard cable depending upon the powers of hearing of the listener. As the public can not be expected to be experts, 30 miles is taken as the commercial limit. Even this limit within the last few years tends towards reduction on account of the ease and low cost with which improved transmission can be obtained by loading circuits; that is, using retardation coils in series with the line at given points. The practice of loading is as yet restricted to Bell companies on account of patents. Hence it behooves the Independent companies all the more to eliminate all possible losses caused by substation and central office equipment.

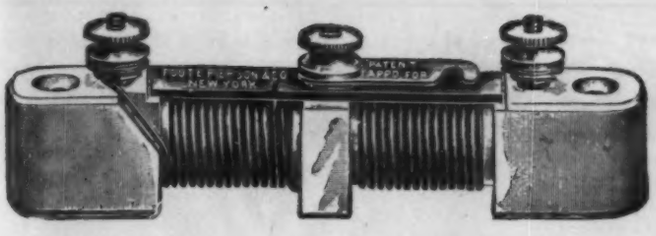
The purpose of this paper is to call attention to the importance of transmission losses, and not to give a technical presentation of the subject; nevertheless, it might be allowable to digress somewhat to consider briefly the factors that determine the quality of transmission.

The different factors determining the qualities of transmission of any circuit consist of resistance, capacity, inductance, and leakage or insulation. A fifth factor may be added which enters into the problem in open wire lines, viz., outside interference, such as induction from neighboring circuits. All five of these factors are important in open aerial wires. In cables, however, all but resistance and capacity can be neglected for practical purposes, so that the calculations of the equivalent of one kind of cable compared to another are relatively simple compared to that of open wire lines.

The losses of a telephone circuit may be divided into three classes, line losses, substation losses, and central office losses. The line losses are further subdivided into cable losses and open wire losses.

Open Wire Losses.

The open wire losses are made up of five factors, as mentioned above: Resistance, depending upon the size, length and kind of material; the capacity, which is independent of the material, but dependent upon the size, spacing and length of the wires; the insulation, or leakage, depending



ARGUS

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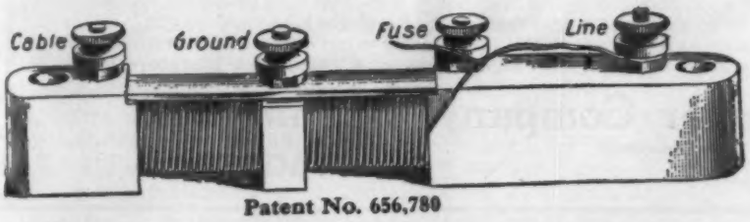

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It does not cause ground or open circuits. It is efficient—and promotes efficient service. Better let us tell you more about the ARGUS—it's to your advantage.

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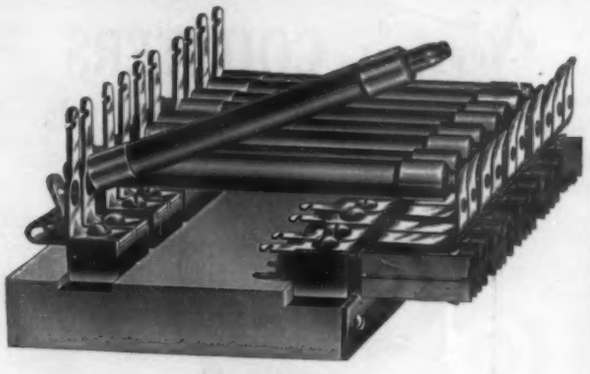

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This protector strip is identical in construction with the No. 247-E with the one difference that the fuses are 3½ inches in length in place of 5 inches as in the No. 247-E.

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upon the style and number of insulators per mile and foreign contacts; self induction, depending upon the length, material, and spacing of the wires; and interference, depending upon the proximity of wires carrying currents affecting the telephone wires.

The resistance can be reduced by increasing the size of the wire. But increasing the size of the wire also increases the capacity, and the full benefits are not obtained, of the decreased resistance. For this reason copper wire has greater transmission efficiency than iron because it combines low resistance, on account of its low specific resistance, with low capacity on account of the smaller size necessary when compared with iron wire.

The capacity of a wire can be reduced by reducing the size of the wire, but this, as mentioned above, would increase the resistance, so it is not feasible. By giving the wires a large separation, the capacity would be reduced, but this is not practical as pins are usually spaced either 10 or 12 inches apart. Loading is the method used of neutralizing the effect of capacity.

Leakage can be reduced by keeping the wires clear of trees and other foreign contacts, and by not using insulators of too small a type. The lower the resistance of the wire, the more important it is to keep the leakage low, or, in other words, insulation high.

The transmission equivalents of different kinds of wire are based on an insulation resistance of 32 megohms per mile. So long as this does not become less than about two megohms per mile, the transmission is not seriously affected, but when the insulation drops to a lesser amount, the losses increase rapidly. The more efficient the circuit, the more pronounced and early is the effect of leakage.

The self induction of a wire has within limits a beneficial affect on transmission, as it neutralizes the evil effect of capacity, and is one of the reasons for the better talking qualities of open wire compared with cable. The method of loading a line makes use of this fact by inserting coils having self induction, in series with the line wire, and these coils are so proportioned as to neutralize the effect of capacity.

Interference can be avoided by a proper system of transposition, and by having as great a space as possible between the telephone and disturbing wires. A small noise may cause a transmission loss equivalent to several miles of cable.

Cable circuits cause a much greater loss than open wires owing to the fact that usually the conductors are of a smaller size, producing high resistance. Being crowded together more closely, the capacity is also much greater than that of open wires. In cables self induction and leakage can be neglected for practical purposes, so that the calculation of the equivalents of one kind of cable in terms of another is comparatively simple compared with that of open wire lines.

Cable Losses.

The transmission losses in a cable are practically proportional to the square root of the product of the mutual capacity and resistance. Hence, after this quantity is known for standard cable, which amounts to 2.18, the equivalent of any other cable can be determined by finding the value of the square root of the product of the mutual capacity and resistance and dividing by 2.18. It thus will be seen that if the capacity of two cables are equal, the transmission is proportional to the square root of the resistance. In other words, keeping the capacity per mile the same, in order to double the efficiency or talking limit of a cable, it is necessary to quadruple the size of the wire. This will indicate how rapidly the cost rises in obtaining improved transmission in telephone cable. Thus, No. 19 B. & S. gage cable has an equivalent of unity, or one mile loss per mile, while No. 13 B. & S. gage cable, the wire of which is four times as heavy as No. 19, has a loss of half that of the No. 19 gage cable, or is only twice as efficient.

The following are approximate values of transmission limits, or the length of line of various kinds of cable and open wire, having a transmission loss equal to thirty miles of standard cable:

Cable.	
No. 22 B. & S. gage .083 mf. mutual capacity....	18 miles
No. 20 B. & S. gage .074 mf. mutual capacity....	23 miles
No. 19 B. & S. gage .074 mf. mutual capacity....	27 miles
No. 19 B. & S. gage .054 mf. mutual capacity....	30 miles
No. 16 B. & S. gage .074 mf. mutual capacity....	39 miles
No. 14 B. & S. gage .074 mf. mutual capacity....	48 miles
No. 13 B. & S. gage .074 mf. mutual capacity....	55 miles
No. 10 B. & S. gage .074 mf. mutual capacity....	77 miles
Open Wire.	
No. 14 Birmingham wire gage, iron.....	75 miles
No. 12 Birmingham wire gage, iron.....	94 miles
No. 10 Birmingham wire gage, iron.....	120 miles
No. 12 B. & S. gage, copper.....	246 miles
No. 10 B. & S. gage, copper.....	353 miles
No. 9 B. & S. gage, copper.....	429 miles
No. 8 B. & S. gage, copper.....	526 miles
No. 6 B. & S. gage, copper.....	811 miles
No. 8 Birmingham wire gage, copper.....	857 miles
No. 12 New British Standard gage, loaded.....	909 miles
No. 8 Birmingham wire gage, loaded.....2,000	miles
No. 8 Birmingham wire gage, loaded phantom.2,273	miles

The phantom circuit of a cable is from 8 to 10 per cent. better than the physical, while the phantom circuit of an open wire is from 15 to 20 per cent. better. It will be noted that the talking limits vary from 18 miles for No. 22 B. & S. gage cable to 2,273 miles for No. 8 B. W. G. loaded phantom, such as is used in talking from New York to Denver. This is a wide range, and give a choice of conductors to use for any given transmission between any two points within given limits.

Knowing the above limits and the performance of substation and switchboard apparatus, the matter of designing a telephone plant for given results becomes an exact science. It it unfortunate, however, that the transmission equivalents of substation and switchboard apparatus of various manufacturers are not known nearly as well as the equivalents of different kinds of wire and cables.

Central Office Losses.

To analyze all the possible losses in central office equipment is a problem too large to be here attempted. It might be said briefly that the losses come under two main heads: Faulty circuit design and faulty equipment. There are some circuits in use which would produce great losses, even if the equipment were the best, and there are other circuits, while correct in design, are deficient because the equipment used is of poor design. Between these two possibilities, there can be any number of variations too numerous to mention.

Faulty circuit design results from giving too much attention to elaborate signaling systems and ignoring possible transmission losses. Only too often signals have been given preference over transmission.

Equipment losses are frequently caused by using steel instead of tinsel cords on toll boards, and worse still when used in circuits supplying the battery to a common battery telephone when connected to a toll line. One of the great sources of losses are inefficient repeating coils. The loss in these may vary from one-fourth mile to four miles or more of cable. The method of supplying battery to a common battery telephone may cause a loss equivalent to five miles of cable. Most circuits do not supply sufficient battery to the transmitter on long distance connections. The effect of operators listening in on a circuit may cause a loss

equaling anywhere from zero to three or more miles of cable. In addition there are the losses due to coils of low impedance bridged across the line and of heat coils, carbon grounds, and dirty key and jacket contacts.

Substation Losses.

Substation losses may be caused by faulty circuit designs, or faulty equipment and other general losses. There is quite a variety of circuits in use which vary greatly in their transmitting efficiency. Even with the best circuits there still are possibilities of faulty equipment, causing losses as follows: Transmitters packed or adjustment too tight; receiver out of adjustment; diaphragm dented; coils partly short circuited; receiver magnet too weak; induction coils inefficient; low resistance ringers bridged across the circuit, or, worse still, in series with the circuit; cords noisy or of high resistance; local batteries exhausted, or, if a common battery instrument, battery too weak on account of high resistance of the subscriber's loop; the hook switch might make poor contact; and general losses may be caused by faulty wiring and carbon grounds.

The possible transmission losses in a common battery instrument are much greater than a local battery instrument, on account of the effect of the resistance of the subscriber's loop upon the amount of battery that is supplied to the transmitter. For this reason the transmission losses of the common battery telephone are divided into two classes, one known as high frequency loss and the other the current supply loss. The high frequency loss is the reduction which the high frequency electrical waves suffer when passing over a circuit. The current supply loss is the loss occasioned by the reduction of current furnished to the transmitter on account of the resistance of the subscriber's loop. Thus a loop consisting of one mile of standard No. 19 B. & S. gage cable would have a high frequency loss of one mile. In addition the loop would have a current supply loss depending upon the switchboard circuit and telephone used, but under the most favorable conditions it would amount to one, and even as high as three miles additional loss. Hence, it is important to keep the resistance of the subscriber's loop within prescribed limits. The current supply loss of the loop usually amounts to more than the high frequency loss. The current supply loss does not affect the receiving efficiency, but only the transmitting efficiency of the instrument.

There is a wide range in the efficiency of magneto telephones on the market, some being better than a standard instrument, and quite a few of them averaging five and even more miles worse. Assuming an instrument of the latter kind in which the batteries are run down, which will cause an additional loss of about four miles, it is not surprising that transmission is poor even with good lines, or good when talking to one subscriber and poor when talking to another in the same exchange.

It is unfortunate that all manufacturers are not in a position or refuse to state the efficiency or performance of their various equipment, and that the consumers do not demand it. The result is that much inefficient apparatus has and is being manufactured. There is no more reason why telephone companies should buy equipment about the exact performance of which they know nothing, than it would be for power stations to buy engines and generators of which they do not know the performance.

In addition to these possible losses, there is still a possibility of losses being introduced on account of using good equipment in the wrong manner, such as using the wrong cord circuit in putting up a toll connection, where several kinds of cords are on the same position of the toll board; or by completing the connection through a recording trunk instead of the specially designed service trunk; or building up a circuit by connecting a poor iron circuit between two copper circuits because it so happens that the intermediate copper circuit was busy, and the chances are on a short haul call for which the iron circuit was intended.

An an illustration of the importance of terminal losses consisting of switchboard and substation losses, the following hypothetical case will be considered: A telephone connected directly to a private branch exchange switchboard, this switchboard connected over a two-mile No. 22 B. & S. gage trunk to a branch office which is connected to a toll board over a No. 19 gage trunk, one mile long, and assuming that the toll operator and the private branch operator are listening in on the circuit. Under these conditions, the losses would approximate 13 miles of cable. Assuming that the equipment on the other end would be the same, the receiving loss would be about nine miles, as there would be no current supply loss. Hence, the combined loss, excluding any toll line loss, would be 22 miles, leaving only eight miles to be lost in the toll line for a 30-mile standard. This would not allow of a very long line without soon exceeding the commercial transmission limit. While this is perhaps a severe condition, nevertheless it is one met with in metropolitan practice, and has to be reckoned with and treated in a special manner. It shows the difficulty of maintaining high transmission in large cities.

From the foregoing it will be evident that it is very important to think not only of the line losses, but also the substation and central office losses. Almost every telephone company could make great improvement in transmission conditions, if a study were made of the various equipment used, a few dollars spent in changing the equipment would often have the same effect as greatly increasing the size of the wires on the toll lines at many times the cost of changing the substation or central office equipment.

The advantages of good transmission are several, one being the increased traffic for good transmission causes subscribers to be more apt to use the long distance lines. It also facilitates the passing of calls by operators as no repeating is necessary and hence less labor is required in making the connection, thus reducing the operating cost per call. It also enables more calls to be handled over a circuit, as subscribers say what they have to say over a good circuit in a shorter time than over a poor circuit which requires much repeating, with the resultant rebate that the telephone company must allow for poor service.

While it is true that the long haul long distance business is not as profitable as the short haul, and that the amount of long haul business is small compared with the shorter haul business, it is, nevertheless, necessary for a telephone company to be able to give both services if prestige is to be maintained for serving the people and competition is to be properly met.

In building a telephone plant, it should be decided what standard of transmission is to be given over the various local lines as well as the long distance lines, so that the proper outside and inside equipment can be selected to obtain this transmission. Only too often plants are built largely by rule of thumb, and not according to the dictates of good engineering practice.

Transmission Equivalents of Apparatus and Lines.

A few years ago little was known with exactness in regard to the transmission equivalents of apparatus and lines. Regarding the line, this is no longer so, and telephone engineering has made rapid strides towards becoming an exact science. Much, however, still remains to be done before as much exact information is available to a designing engineer regarding the performance of the different kinds of

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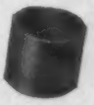

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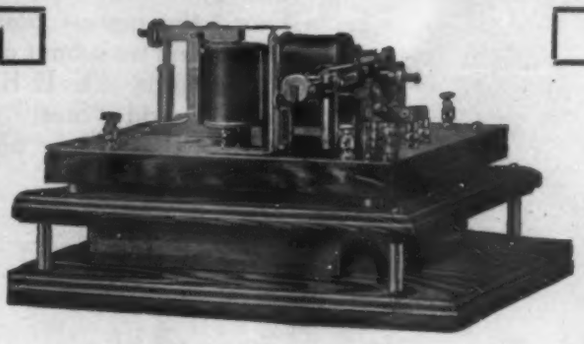

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substation and central office equipment of various manufacturers as there should be to eliminate all guess-work.

The lack of knowledge of transmission equivalents has resulted in money being spent where it should not have been, and thus wasted and not put where it should have been. This is a very important matter when expenditures run into such large sums of money as in the telephone business. It is to be hoped that the Telephone Service Association may be the cause of obtaining much of the information which is now lacking regarding the performance of the various makes of apparatus.

Owing to the severe and unscrupulous competition between manufacturers and the unappreciativeness of efficient apparatus by many telephone companies, it has happened only too frequently that the saving of a few cents in the first cost of equipment has been allowed to reduce the efficiency of transmission. The result is that instead of paying a few cents more for efficient apparatus, dollars must be spent to make up for equipment losses by increasing the size of the toll line wire. It is evident, therefore, that it is good economy to get the most efficient apparatus, irrespective of the slightly increased cost, for to obtain the same improvement the line wires cost many times more than the equipment.

The transmission equivalents given for different equipment assumes that all equipment is in ideal condition. As this is hardly ever possible, the need is very evident of having a margin to allow for any losses due to conditions not ideal. For if good service is to be given day in and day out, there must be a margin allowing for bad weather losses and other slight failures of equipment which are bound to happen. As enumerated above, there are many things that will happen which tend to decrease the transmission, and but few, if any, that will improve the transmission.

Good transmission is of utmost importance in order to meet competition. Only too often one will hear the Independent telephone called the local telephone and the Bell telephone called the long distance telephone. This is the result of the early days of telephony when Independent long distance lines did not exist, so that today the Independent companies have difficulty in getting their proper share of the long distance business on account of the fixed notion in the mind of the public.

Many companies are not getting the benefit of the investment they have in their heavy copper lines on account of poor maintenance, which should be very evident; and also on account of losses in switchboard and subscribers' instruments, which losses, unfortunately, are not so evident, but exist, nevertheless.

Transmission can be much improved by remedying little things at a small cost. In the past there has been much equipment made in the early days in which the transmission losses were considerable, which is still in use and interfering with good long distance service.

It is not sufficient for one company at one end of the line to use care regarding transmission, as the terminating company or an intermediate company might introduce large losses which could easily be avoided, and which nullify any good work done by another company. Hence, every company should make an examination of its conditions and rectify anything that needs attention and in this way improve the standard of Independent long distance service and reap the financial reward which will follow.

New Corporation Taxing Law in California.

A radical change in the systems of taxing corporation franchises in California is made in a bill which has passed the state senate after having been approved by the assembly. The measure will affect every corporation in the state except those designated by law as "common carriers," which are taxed in another manner.

Briefly, it writes into the law the decision of the California Supreme Court in the Bank of California cases, where it was decreed that the value of a franchise was represented in the difference between the market value of the outstanding stocks and bonds of a corporation and the actual value of its tangible property.

Bell Companies Object to Proposed Pennsylvania Rates.

In the May 17 issue of TELEPHONY was published an account of the protests made by Independent telephone companies of Pennsylvania before the Pennsylvania Railroad Commission against the rate reductions proposed by the commission. The Bell Telephone Co. of Pennsylvania and the Central District & Printing Telegraph Co. have also recently appeared before the commission in opposition to the proposed reductions. The representatives of these companies declared that existing rates provide only a reasonable return on the investment and that reductions under the tentative schedule would be unreasonable.

The classification of exchanges by population was objected to because it only recognizes one of the many factors which must be considered in fixing rates, and it was argued that conditions of discrimination between localities will be created. The companies pointed out that the schedule fails to provide for competitive situations which have grown up in the past, and which present dissimilar conditions from those presented where there is no competitor.

It was further claimed that the schedule is incomplete in that it only provides for exchange service, whereas there are various classes of telephone service, all of which are inter-related and inter-dependent upon each other.

The telephones companies maintain that the existing schedules were put into effect after a thorough and comprehensive investigation of the telephone situation throughout the state and it was insisted that there is no sufficient reason or justification for disturbing these rates.

Vermont Telephone Companies to be Investigated.

Governor Allen M. Fletcher of Vermont has appointed Warren A. Graham of Bellows Falls, secretary of civil and military affairs and Edward A. Cook of Lyndon, both lawyers, to conduct an investigation of the telephone companies in the state. This action is the result of a petition of subscribers of the New England Telephone & Telegraph Co. and subsidiary lines in the northern counties.

Mr. Cook lives in the home town of President Theodore N. Vail of the American Telegraph & Telephone Co. He is a member of the General Assembly and leader of the Progressive party in the House of Representatives. Messrs. Cook and Graham acted as special counsel for the state before the state appeal board in hearings which resulted in increasing the railroad valuation in Vermont more than twenty million dollars.

Joint Service Application Denied by Ohio Commission.

The Public Service Commission of Ohio has denied the joint application of the Clinton Telephone Co., Clinton, Ohio, and the New Burlington Mutual Telephone Co., of New Burlington, Ohio, for the operation of the two systems in connection with each other and has also refused to sanction the sale of certain property by the former to the latter company.

Telephone Booths in New York Subway.

The Interborough Rapid Transit Co. of New York City has arranged for a trial installation of telephones in certain stations of the subway. The telephones will be placed in booths for the convenience of the public.

From Factory and Salesroom

Convention: Mississippi Independent Telephone Association, Corinth, June 17, 18

Rooting for Stromberg-Carlson.

Our old friend Phoney Bill comes out this month as star rooter for the home team and naturally he has a front place among the fans, as shown by the June calendar blotter of the Stromberg-Carlson Telephone Mfg. Co. Phoney Bill gets

Phoney Bill, the Baseball Rooter.

along very well without a megaphone because the noise he makes "listens good" and everybody is anxious to hear what Phoney Bill says, "Shout," says he, "for Stromberg-Carlson."

W. W. Anderson with the Lloyd-Thomas Co.

W. W. Anderson, who has been chosen by the Lloyd-Thomas Co., appraisers and engineers, 4277-4737 Evanston Ave., Chicago, Ill., to head its electrical engineering department, has had a very successful career in the telephone field.

Mr. Anderson started in this line of work with the Mc-

W. W. Anderson.

Lean Electric Co., Greencastle, Ind., in the early part of 1900, assembling and installing telephones. After a few months of this work he was made salesman for Indiana and Illinois. At the end of 1903 he became connected with the Indianapolis Telephone Co., one of the largest Independent telephone companies in the central states. After two years with this company his services were secured by the Central Union Telephone Co. and later by the Western Electric Co., where he was engaged in the Independent sales engineering department. After five years' services there he was chosen by the Arnold Co. for a very important position in connection with the appraisal of the Chicago Telephone Co.'s property and later acted as an expert for this company in behalf of the city of Lincoln, Neb., in a case involving an increase in rates applied for by the Lincoln Telephone & Telegraph Co.

The Lloyd-Thomas Co. is to be congratulated on its good fortune in securing a man of such broad experience to head its newly organized department, as he has long been considered an authority on matters pertaining to public utilities.

Qualls Graphic Chart System.

This is an age of advancement and one of the most progressive telephone men in the country is Wm. F. Qualls, general manager of the Decatur County Independent Telephone Co., Greeensburg, Ind. The traffic sheet on the next page, therefore, will be of interest to readers, as it is the product of his ingenuity. Counting by seasons, Mr. Qualls is a young man; in the broad field of telephone experience, however, he may be classed as one of the pioneers.

When Mr. Qualls took charge of the Greensburg plant about six years ago he found the system in a very unsatisfactory condition owing to neglect and lack of man-

Wm. F. Qualls, Expert on Service Efficiency.

agement. No records had been kept and subscribers were very much dissatisfied with the service. Nine operators were on duty during the busy period, a total of over 100 operator-hours per day. This force was handling less than 4,000 calls per day, at a cost of $3.09 per thousand calls.

About two years ago, upon Mr. Qualls' recommendation, the company decided to install Automanual equipment. A glance at the traffic sheet referred to will show the results derived from this installation, which were far beyond the most sanguine expectations of the company.

By December, 1912, it had taken over the Bell lines and their traffic had increased to over 13,000 calls per day. The operating force had, however, been reduced to sixty-nine and one-half operator-hours per day and the cost had been

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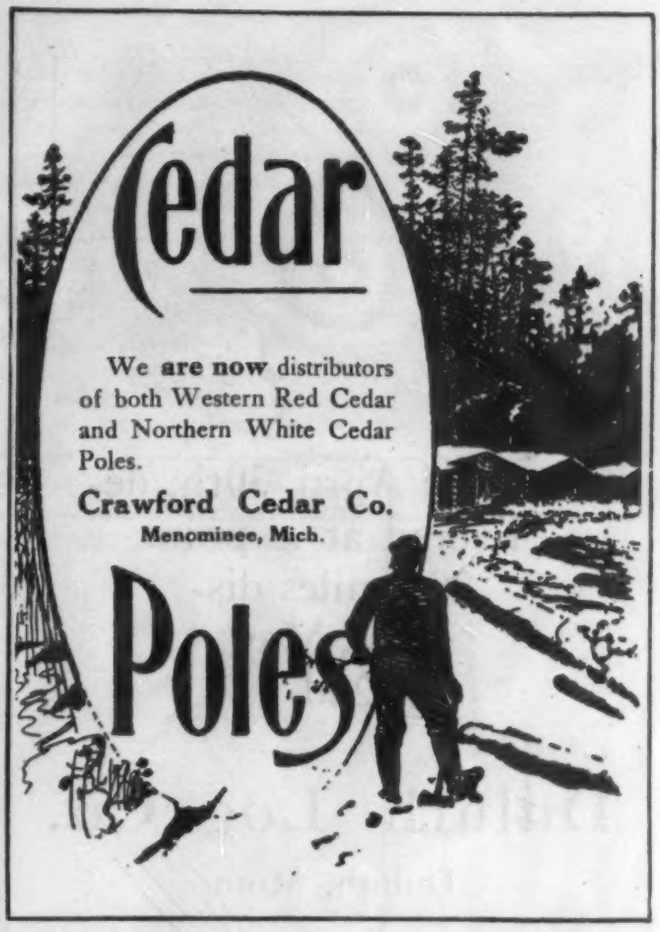

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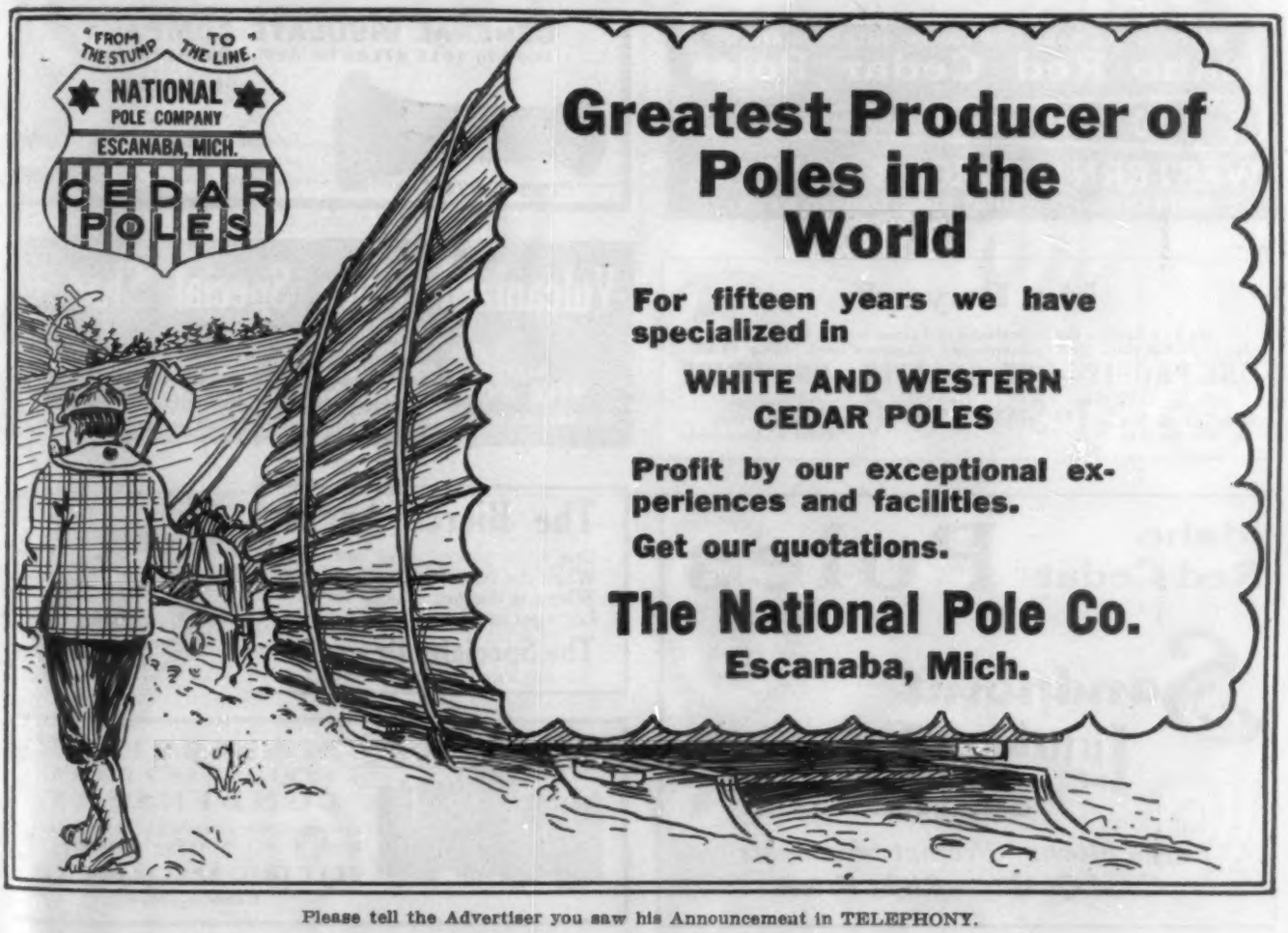

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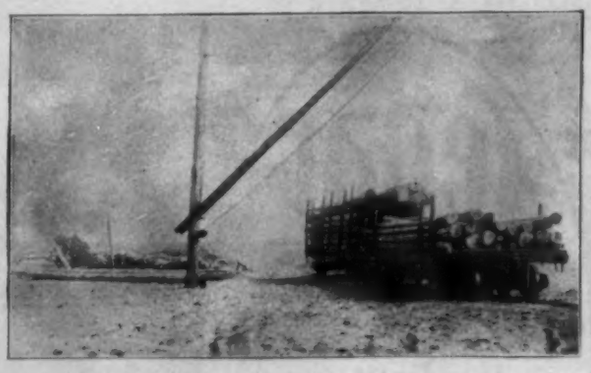

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They last longer in any soil—Stand twice the breaking strain of others.

CHESTNUT POLES LARGE STOCKS LOW PRICES QUICK SHIPMENTS

Write to-day to PADUCAH POLE & TIMBER CO.,
Paducah, Kentucky

We Want Your Pole Orders

QUALITY? Idaho, Michigan and Canadian Cedar. The Best that grow.
PRICES? Remarkably reasonable!
SERVICE? Immediate shipments—any quantity! Poles in *stock*. We produce our own.

No matter where you are, our yard locations and shipping facilities make it possible to reach you in a hurry.

THE F. BISSELL COMPANY, Toledo, Ohio.

WRITE US—WE MAKE LOW PRICES—SHIP GOOD STOCK
Idaho Red Cedar Poles
30 CEDAR YARDS IN IDAHO, WASH. AND B.C.
WESTERN LUMBER & POLE CO.
Main Office: "Electric" Bldg., Denver, Colo.

W. C. STERLING & SON CO.
POLES OF STERLING QUALITY
Oldest Cedar Pole Firm in Business — Pioneers for 33 Years
MICHIGAN AND WESTERN CEDAR
W. C. STERLING & SON COMPANY
1880 MONROE, MICHIGAN 1913

GENERAL INSULATE COMPANY
1007 to 1015 ATLANTIC AVE., BROOKLYN, N. Y.

"INSULATE"
Unrivaled
Telephone Receiver Shells, Mouthpieces and Electrical Insulations; Cheerfully Quoted.

Mr. Buyer?
Do You Realize the Importance of Buying from a Producer?
Our POLES Have Our Concentrated Attention from Stump to Car.
ONE PROFIT—ONE QUALITY—ONE PRICE
954 Security Bank Bldg., Minneapolis, Minn.
TRI-STATE CEDAR CO.
206-209 Harding Bldg. Coeur-d'-Alene, Idaho

Vulcanized Fibre Special Shapes
Machined to Exact Gauge
Vulcanized Fibre in Sheets, Rods and Tubes
BAKELITE-DILECTO—High Efficeency, Water Resisting FIBRE
THE CONTINENTAL FIBRE COMPANY
CHICAGO, McCormick Bldg. NEWARK, DEL. NEW YORK, Woolworth Bldg.

Idaho Red Cedar Poles
Sandpoint Lumber & Pole Co., Ltd.
SANDPOINT, IDAHO.
Large Stocks—Prompt Shipments
Good Quality—Right Prices

The Bierce Anchor
One solid piece. Will not creep.
When the best is also the cheapest.
Where is the argument?
Let's get acquainted.
The Specialty Device Co.
CINCINNATI, OHIO

"MANSBRIDGE" TYPE, TELEPHONE CONDENSERS
embody all the essentials of long life and good service. *Write for Literature*
ELECTRIC SPECIALTY CO.
Cresco, Iowa

Please tell the Advertiser you saw his Announcement in TELEPHONY.

reduced to .459 cents per thousand calls for operator service.

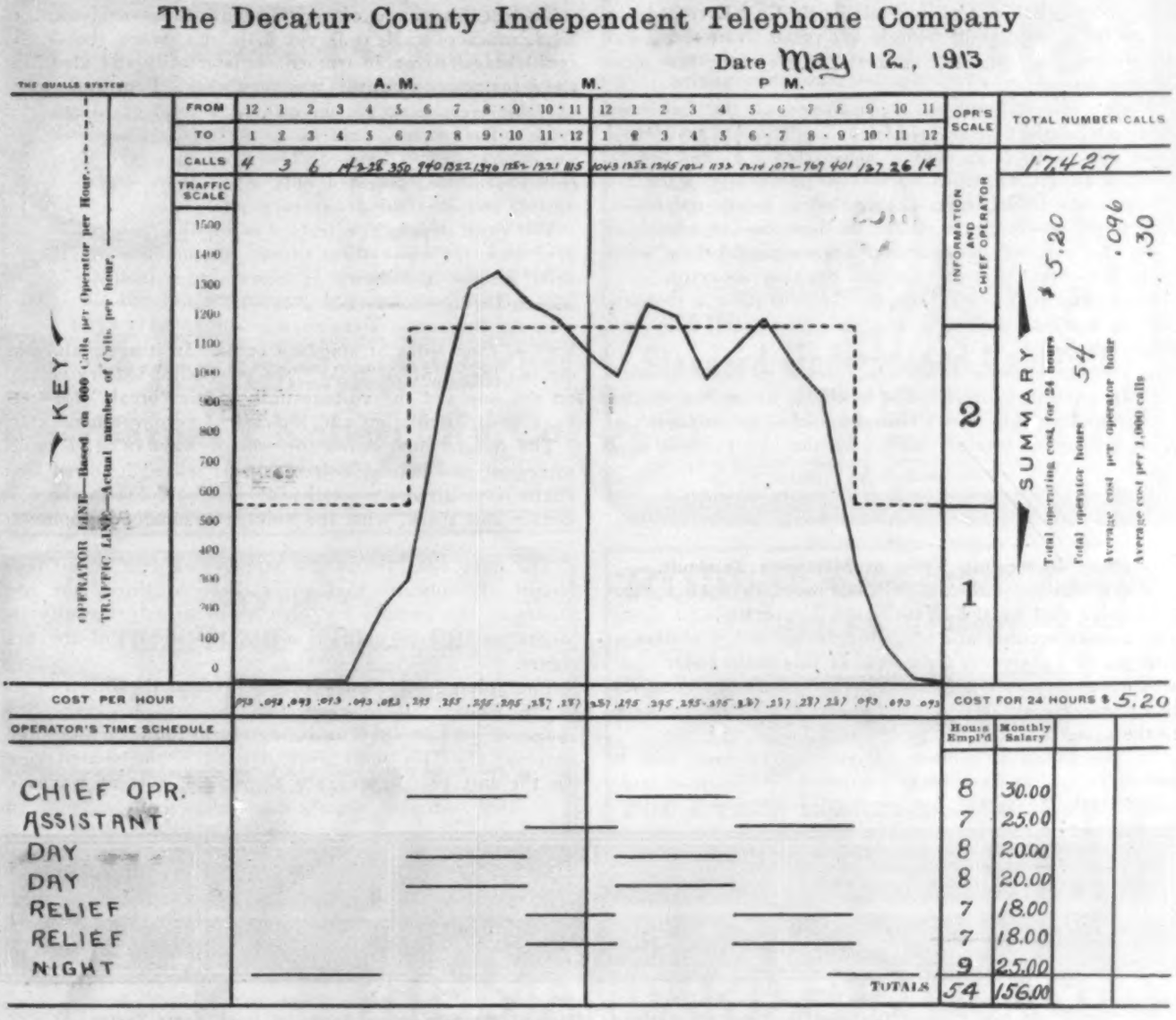
This was an excellent showing, but Mr. Qualls was not yet satisfied. At that time farm lines were still being handled by manual apparatus, which necessitated trunking farm calls. It was decided, therefore, to connect all farm lines to the Automanual switches. In April, 1913, after the complete cut over the traffic had increased to over 16,000 calls per day and the force had been reduced to 54 operator-hours per day, the cost being reduced to .313 cents per thousand calls.

On May 12, 1913, the traffic had increased to 17,427 calls, 1,396 calls being handled between the hours of 8 a. m. and 9 a. m. The total cost for operators for the entire day was $5.20 or 30 cents per thousand calls. Subscribers readily respond to improved operating conditions and this wonderful increase in traffic is declared to be typical of all exchanges which have been equipped with Automanual.

By referring to the traffic sheet it may be noted that Mr. Qualls has established an excellent operating schedule. The chief operator and the two regular day operators are on duty from 6 a. m. to 10 a. m., being relieved by the assistant chief and two relief operators who work until 1 p. m., when the regular operators again come on duty, being relieved by the assistants at 5 p. m. The assistant operators work until 9 p. m., when they are relieved by the night operator, who is on duty until 6 in the morning.

Mr. Qualls states that his chief operator can cut in her key set and help regular operators if they should be overloaded at any time. She also acts as information operator. The present force expects to handle at least 20,000 calls per day, which will reduce the operating cost to approximately 25 cents per thousand calls.

This wonderful showing is the result of efficient management and the adoption of twentieth century apparatus. Synchromonic five-party selective service is furnished party line subscribers in the city. The farm line subscribers are provided with synchromonic ten-party selective service.



Traffic Sheet of the Decatur County Telephone Co., Greensburg, Ind.

Mr. Qualls is justly proud of his plant and will cheerfully answer any inquiries with reference to his "system". He is preparing a chart which will show the actual number of telephones in operation, the amount of trouble per month and cost of maintenance.

"Way Down in Georgia."

Down below the old Mason and Dixon line great things are happening nowadays. The great awakening the South has been experiencing the past few years is beginning to show material evidences of the great prosperity this section of the country is enjoying.

The "Sunny Southland," "a great empire in itself," is

going forward with leaps and bounds agriculturally and commercially. More acres of cotton, corn, tobacco, etc., are being planted every year. Great power projects are making possible the erection of new cotton mills and other industries so that the whole land is a great hive of industry.

No section of the South shows the result of this great awakening more than Georgia. With characteristic energy the people of this state have been among the leaders in developing the great natural resources of their native state.

Atlanta, the metropolis of Georgia, is a city of which any state may well be proud. It is modern, prosperous, hustling and thoroughly up to date in every respect.

One of the liveliest and most hustling businesses in Georgia is that of the Baltimore Electrical Supply Co. Everybody in the electrical business in Georgia knows all about them, and the customers say they get the best goods and the best service from them.

A man named Smith is the manager of the Baltimore Electrical Supply Co., and although Smith is not an unusual name, this Smith is an unusual man. He's a hustler and he knows a good thing when he sees it. Therefore, when the Baltimore Electrical Supply Co. decided to handle telephones, they put it up to Smith to get the best line of telephones made. As was said before, Smith knows a good thing when he sees it—that's why he selected Ericsson apparatus.

The Baltimore Electrical Supply Co. now carry a complete line of Ericsson apparatus and save customers delay and freight charges.

In addition to being notable because of its rapid commercial advancement, Georgia is also noted for its peaches and for Ty Cobb. Everyody knows Georgia peaches are the best that grow, and every baseball fan knows that Ty Cobb is some "peach."

Smith says he is going to push Ericsson apparatus to beat the band, and he'll sure do it. Smith's a "peach" too.

Some Interesting Tests of Matthews Telefault.

Just recently Matthews Telefault went through a most exhaustive test at the Washington University, St. Louis. The results secured are very interesting and doubtless of interest to TELEPHONY's readers, as this fault finder operates on principles not found in other sets. For comparative purposes, an instrument of another type was subjected to the same tests.

In the following outline, Matthews Telefault will be known as "*A*" and the other set as "*B*." The most interesting test was for a dead short circuit. This kind of a fault was made in a piece of standard, 25-pair, paper insulated, cable, approximately 100 feet in length.

The *A* and *B* sets were connected by means of double pole, double throw, knife switches, so that either instrument could be connected to the same source of battery and to the cable momentarily. The battery used was made up of four dry cells. In the first test, a 110-volt, 16-candlepower incandescent lamp (250-352 ohms resistance) was cut in series with the cable at the instrument end.

The tones from the sets were picked up near the faults —that from set *A* being more accurate and clearer, giving a low tone, while set *B* gave a high tone.

When set *B* was in the circuit, it was noted that the carbon filament of the lamp showed a dull red. When set *A* was connected, the lamp was not lighted in the least respect, thus showing the voltage from set *A* was much lower than that from set *B*.

As the average cable run is about four miles in length, a standard Leeds & Northrup artificial cable set was inserted between the instruments and the telephone cable. In this test the exploring coil of set *A*, picked up its own instrument very clearly, also the tone from the other set *B*, results could be obtained from the exploring coil set *B*, from either of the sets. It would only pick up the tone within a short distance of the sets.

To test the range of the instrument the equivalent of eight miles of cable was cut in circuit, when the *A* coil could hear its own instrument satisfactorily and also hear the *B* instrument, but this was very weak. Four more miles of cable were next cut in, making a total of 16 miles of cable. The *A* set could be heard satisfactorily, but not quite as strong as before. The *B* set, however, was practically dead, being heard only when there was no noise outside and everything was very quiet.

The next step in the tests was oscillograph records, to determine the wave form of the instruments and the results secured are shown in views 1 to 6 inclusive of the accompanying illustration.

In the first view is shown the voltage wave of *A* with a load of four miles of standard cable. In it are plainly indicated the point of "make," the interval of battery voltage on the line and the voltage peak at the "break," followed by a small oscillation and interval of zero voltage.

The second view shows the voltage wave of set *B* under same test and indicates the peak at "make" followed by a slight reversal, and a small peak at break, due to the condenser and spark, with the voltage gradually dropping to zero.

The next view shows the voltage wave of *A* on open circuit. It indicates that under these conditions the constants of the circuits are such as to greatly magnify the slight oscillations noticed in load as shown in the first figure.

The voltage wave on *B* on open circuit is shown in the fourth figure. It indicates that the load has very little influence on the wave form, merely introducing the slight reversal after the main peak noticed in the second view. In the last two figures are shown the current waves of *A* and *B* under a load of 22 miles of cable. It will be noted that this wave followed the voltage wave, exactly in the case of *A*, and very closely in the case of *B*.

Oscillograph Records Obtained in Tests of Matthews Telefault, Showing Wave Forms of Instruments Tested.

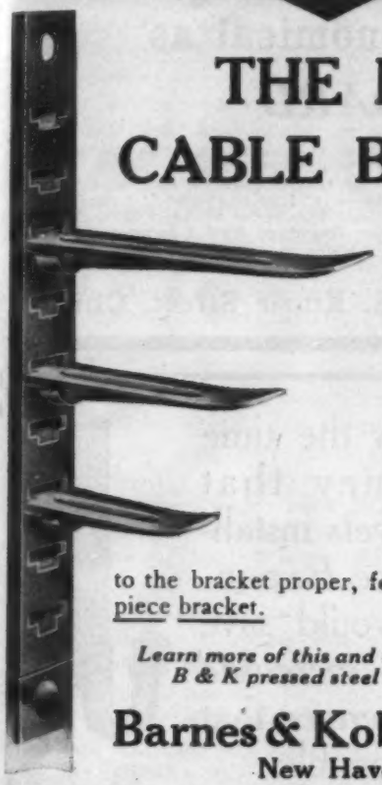
These oscillograph records show that the *A* set maintains its tone under increases in load and that it does not interfere with the surrounding working pairs in the cable.

Paragraphs.

The following companies, known to TELEPHONY's readers, had exhibits at the thirty-sixth annual convention of the National Electric Light Association, held in Chicago the past week: Duplex Metals Co., Chester, Pa.; Hubbard & Co., Pittsburg, Pa.; H. W. Johns-Manville Co., New York City; W.

B&K

THE B & K CABLE BRACKET



Strong, durable — will easily sustain 200 lb. weight at extreme end of the 10 in. bracket. Note the range of sizes allowed by T slotting of Channel iron. The great output per day of pressed steel makes it the lowest in cost of any cable bracket on the market. The heel is electrically welded to the bracket proper, forming practically a one piece bracket.

Learn more of this and other specialties of the B & K pressed steel pole line hardware.

Barnes & Kobert Mfg. Co.
New Haven, Conn.

Consider the high quality

of "STANDARD" Telephone Wires and Cables, their reputation for economy and reliability in service, before buying!

C. C. C.=E. B. B.
(Trade Mark)

that is Colonial Copper Clad Wire stands among copper clad wire products for the very highest quality, just as E. B. B. does among galvanized wire products.

"STANDARD" Telephone Cables

are guaranteed by a third of a century of experience in the manufacture of high grade electric cables. We can supply them in all insulations and all sizes.

Write our nearest branch office for prices before you buy.

Standard Underground Cable Co.
Pittsburgh, Pa.

New York Philadelphia Chicago
Boston San Francisco St. Louis

For Canada: Standard Underground Cable Co., of Canada, Limited, Hamilton, Ont.

HYDE'S TELEPHONE TROUBLES and HOW TO FIND THEM

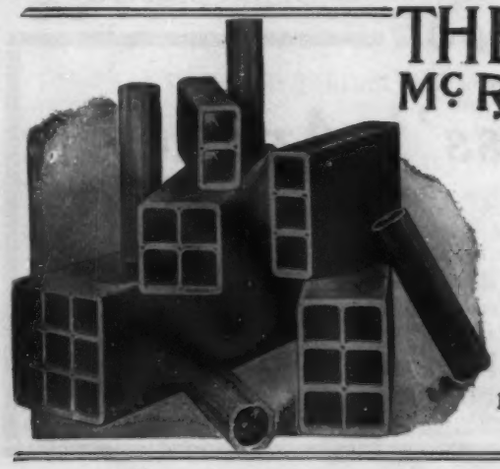
An up-to-date manual pertaining to Telephone Troubles and their remedies on both magneto and Common Battery Systems—also containes table of *Cost Units* for estimate work. The use of all technical terms has been avoided. No telephone man can well afford to be without this handy book—it costs but 25c.

For sale by
TELEPHONY PUBLISHING CO.
MONADNOCK BLOCK — CHICAGO

Rubber Covered Wire and Cables

For Every Electrical Requirement
National India Rubber Co.
Factory, Bristol, R. I., Sales Office, 30 Church St., N. Y.
Clinton and Van Buren Sts., Chicago, Ill. 579 Howard St., San Francisco
201 Devonshire St., Boston, Mass.

THE STANDARD FOR QUALITY
McROY — CONDUITS — CAMP
The Pioneer Manufacturers



Specify either of the above standard makes when writing your underground specifications.

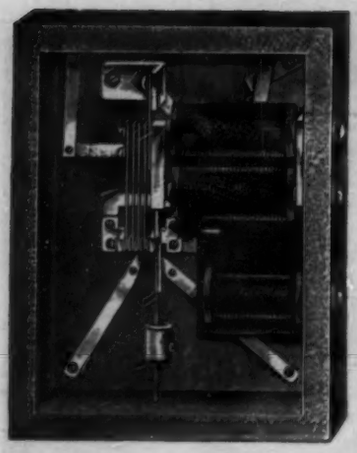
Factories East and West, enable us to figure reduced freight rates, assuring you of the lowest delivered prices without sacrificing quality in any way.

Large stocks of both single and multiple duct constantly carried, thus insuring an early delivery.

Our conduits have been used for twenty-three years. Inquire about us in any city where conduits have been installed.

McROY CLAY WORKS
The Rookery, Chicago

H. B. CAMP COMPANY
New York Pittsburgh Chicago



You Cannot Get a Pole Changer as Efficient or as Economical as *THE STANDARD*

Install the Standard and let it run—requires absolutely no attention and has no delicate parts to wear out. Works perfectly on alternating and direct pulsating current ringing—50 or 60 ordinary dry batteries will do the work. A more efficient or economical pole changer could not be designed.

We know the Standard Pole changer will meet your requirements—the strongest proof of this is that we will send you one on 30 days' free trial and if found as represented, the price is only $15. The use of the Standard Pole Changer on all your exchanges is a great saving.

CURRENT ELECTRIC CO., 18 E. Kinzie Street, Chicago

What's in a Name?

WE hold it all depends on the name. Here's how our opinion was formed: On each of our telephones we put a name plate reading

Chicago Telephone Supply Co.
Elkhart, Ind., U. S. A.

Telephone companies have had numerous requests for the "phone with the Chicago name plate"—subscribers specify them—they want a phone like Smith's—his is a good phone—he's had it years and has had excellent service—he's satisfied—they will be too.

So, we say, it all depends on the name.

Write for literature showing how you can make the name "Chicago" work to your advantage—and a few words about our Free Trouble Insurance policy.

Chicago Telephone Supply Co.
Elkhart, Indiana

IF you knew the time and money that *Peirce Brackets* installed with *Peirce Expansion Bolts* would save you, and the *increased distribution service* that they make possible

You Would Install Them Now

But you don't know this — you won't take the time to send a post card requesting literature that "shows how." Honestly, you don't know what you are missing—surely it's worth a postal.

HUBBARD & CO.
New York Pittsburgh Chicago

Your Pocket Book

will not keep you from installing the

"Faultless" Anchor

The cost is very low—ask for our price list.

Do you know of the holding power of the Faultless Anchor - the strength—its durability—all parts galvanized after threading. Heads, fins, bottoms made out of gray iron.

Write for literature and price list—please your pocket book. Your jobber handles them.

FAULTLESS ANCHOR CO., Fostoria, Ohio

DISTRIBUTORS:
The Union Electric Co., Pittsburg, Pa. Ermer & Hopkins Co., Columbus, Ohio
The Republic Elect. Co., Cleveland, Ohio The Korsmeyer Co., Lincoln, Neb
The St. Paul Elect. Co., St. Paul, Minn.

N. Matthews & Bros., St. Louis; Oshkosh Mfg. Co., Oshkosh, Wis.; John A. Roebling's Sons Co., Trenton, N. J.; Standard Underground Cable Co., Pittsburg, Pa.; Weston Electrical Instrument Co., Newark, N. J.

The Everstick Anchor Co., St. Louis, did not exhibit but was represented by its president, Jasper Blackburn and by Mr. Vickers.

Robert Miller made many know that he was connected with the Indiana Steel & Wire Co., of Muncie, Ind.

Stromberg-Carlson Telephone Co., Rochester, N. Y., has issued a circular descriptive of its "Telodetective" device for use by police departments and detective agencies. This is an extremely sensitive telephone instrument to be used for criminal investigating purposes and, while in service, to be operated without the knowledge of the suspected parties.

The Universal Cable Grip Co., Syracuse, N. Y., manufacturer of specialty construction tools and appliances, has issued literature concerning its new "universal red top drive anchor." This anchor is of novel design, and weighs 10 lbs. when of standard 55 in. length. The company announces the removal of its general office and factory to 216 West Adams street, Syracuse.

Duplex Metals Co., Chester, Pa., has issued another of its cartoon circulars entitled "New Clothes for Old," advising companies not to cut old copper wires for ties, as copper clad ties can be purchased in convenient bundles, cut to length, dead soft annealed and burlapped for less per pound than can be obtained for old copper wire when sold for scrap. It is declared also that copper clad wires are better than copper because they're stronger.

The Current Electric Co., Chicago, manufacturer of the Standard pole changer, states that its business is steadily increasing as is also the list of satisfied users of the pole changer.

American Steel & Wire Co., Chicago, is now sending out copies of its latest publication, The American Wire Wheel News. In it is given a complete resumé of the art of wire wheel making for automobile use. The advantages of wire wheels are clearly set forth together with descriptions of the various makes now on the market. The use of wire wheels for automobiles is still in its infancy but it is not at all unlikely that the present type of wooden wheel will be superseded to a large extent by the wire wheel in the near future. For that reason, the publication is extremely interesting as showing fully the condition of this new industry. Copies of the issue may be obtained upon request.

McRoy Clay Works, Chicago, on its June blotter calendar says: "When the fellow who is jealous of your speed can't think of anything else, he generally calls you a 'fat head.'"

Book Reviews.

The Electric Motor and Its Operation. By Elmer E. Burns. Published by the Joseph G. Branch Publishing Co., Chicago, 190 pages with illustrations. Price, $1.50.

The book takes up the subject of motors from the standpoint of the man in the plant. The first chapter explains the action of an electric current in producing motion and thus leading up to the subject of motors. The different factors which enter into the operation of motors are discussed, after which the various types of direct and alternating current motors are described.

Alternating Currents Simplified. By Elmer E. Burns. Published by the Joseph G. Branch Publishing Co., Chicago, 200 pages with illustrations. Price, $1.50.

The principles of alternating current action are very clearly set forth in this book. Examples are used with synonyms which explain simply yet concisely the meanings of the various terms used in alternating current practice.

After a careful reading of the book, a practical electrician will have a well formulated idea of self induction, capacity, power factor, phase and frequency, as well as a good understanding of the action of alternating currents and machinery. The subject matter is arranged in a most logical manner while the illustrations are easy to comprehend.

Practical Mathematics for the Engineer and Electrician. By Elmer E. Burns and Joseph G. Branch. Published by the Joseph G. Branch Publishing Co., Chicago, 143 pages, with tables and illustrations. Price, $1.

The book is intended for use by the man working in a power plant who wishes to know how the various quantities, such as horsepower, cost of power, etc., are figured. It is assumed that only the rudiments of arithmetic are known, so the book starts with an explanation of fractions and their uses, treating of both common and decimal fractions. After a thorough but simple treatment of fractions, the practical application of mathematics in finding the horsepower of an engine, capacity of tanks and boilers, and the cost of power is taken up.

Some of the simple applications of algebra and trigonometry are then taken up. Examples are selected which deal only with quantities encountered in every day work in a power plant.

Men employed in generating stations and practical power plant work will find much to interest them in this book, as it includes both steam and electrical data.

Telephone Aids in Long Beach Disaster.

The telephone recently played an active part in the work of rescue at Long Beach, Cal., when the floor of the auditorium at that resort collapsed letting several hundred people drop in a mass to the lower floors of the structure.

The first news of the accident and call for aid went over the long distance phone to Los Angeles where the wires were kept busy with calls for doctors, nurses and police. Even the Los Angeles fire department was notified and kept in readiness to respond if fire broke out in the beach town. Within an incredibly short time doctors and nurses were on the ground caring for the injured ones. Thirty-six people were killed and some two hundred injured.

After the rescue the telephone company learned that many of the survivors desired long distance connection and were without funds owing to losses in the crush and they at once ordered all such messages franked.

Telephone Situation at Sioux Falls, S. D.

The Dakota Central Telephone Co. has made an effort to affect a compromise with the city council of Sioux Falls, S. D., on the telephone franchise situation. The company submitted a proposition in writing to Mayor Hitchcock through the medium of the Commercial Club. The company desires to submit the question of rates to the commissioners of railroads, and if that does not suit the council, it will agree to the appointment of an arbitration board of three members, one to be named by the company, one by the city and the two to select a third; the company also agrees to pay up all its indebtedness to the city and withdraw its defense of the suits instigated by the city; it declines, however, to accept the clause in the new franchise providing for the purchase of the plant by the city, on the ground that this would be a cloud on the title of the plant and affect its financial transactions.

Medals for Flood Heroes.

J. A. Bell, of Dayton, O., and Thomas E. Green, of Columbus, the two telephone operators who proved themselves heroes of an unusual type during the March flood, keeping the lines open long beyond the time that telephonic communication could have been had but for their self-sacrificing efforts, were remembered by the state legislature recently when the sum of $100 was set aside for the purchase of a gold medal for each.

Legal Cases and Decisions

By A. H. McMillan

This is Damages for Induction.

"We have a rural exchange of grounded party lines, constructed for the most part along the public highways. We have been in operation six years and have been giving fair service until recently, when a power company constructed a transmission line (110,000 volts) through the country, crossing our lines some 10 or 12 times and putting two of our longest and heaviest loaded lines entirely out of business. The transmission line does not run along the highways but straight through farms, the company having bought the right of way of the owner of the property.

Ours is a regularly incorporated stock company and we have permission from the county authorities to construct our lines along the public highways of the county. We wish to know if we can obtain damages."

For any damages caused by induction, the later established company is liable. If you can obviate the effects of induction by increasing the distance between your wires and those of the electric company, it is your duty to do so, on the theory that you should make the damages as small as possible. The necessary expense of avoiding the trouble from induction in this way would be a proper item of damage. Rocky Mountain Bell Telephone Co. vs. Salt Lake City Railway Co., 3 American Electrical Cases, 356; Nebraska Telephone Co. vs. York Gas & Electric Co., 27 Nebraska 284, 3 American Electrical Cases, 364; McMillen on Telephone Law Section 139.

Private Switches in Rural Lines.

"We have parties that have two telephone lines and they have installed knife switches and extension bells so they can go from one line to another. The service is good and if a neighbor wants to talk through, they let him do so. There are two or three persons who say that they are going to make these parties take the switches out. They want them to come through an old switchboard through which one cannot hear half of the time.

The bells and switches are private property and did not cost anybody a cent, except the parties that have them and they do not charge any one to use them. These are farmers' lines and have not been incorporated. Can the objecting persons take this to law and compel these parties to take the switches out? When they, themselves cannot get central, they use the switches, but still keep on kicking."

We do not know of any theory upon which the "kickers" can compel the removal of the switches and bells. If they are, as we assume, members of the farmers' lines, they might persuade the other members to have the switches removed by action of the unincorporated company. This is the only way we know of that they could cover the matter.

Calling During Thunder Storms.

"We have in effect as one of our rules and have it printed in our directories the notice, do not call during a thunderstorm. Our reason for this rule is that we do not wish our operators to 'go in' on lines which are in the path of electrical trouble, as we believe that there is such an element of risk as to endanger the operator and also other parties who might be using the line at a time when some heavy lightning discharge takes place upon it. Is not our supposition correct and is not the rule a reasonable one? Also is it not quite generally in use by other companies?"

We consider your supposition correct and the rule a reasonable one. Some companies have such rules but others do not. The use of proper lightning arresters would make such a rule less necessary.

Injury to Telephone Lineman on Electric Light Pole.

A telephone lineman to repair wires, went on the pole of an electric light company, but did not complete his work that day. The next day he returned and went on the pole, suspending a platform upon which he worked above its wires. The platform, according to the testimony of the lineman, rested upon one of the light company's wires. While in this position the lineman was injured by a shock from the wire of the light company.

In a suit against the light company, it was held that the telephone employe was at most a mere licensee and the light company did not owe him the duty of ordinary care. Just before the lineman had left the place on the first day, the chief lineman of the light company visited it. It was held that a reasonable belief on the part of the chief lineman of the light company that the telephone lineman would probably return the following morning to resume his work, was not sufficient to charge the light company with the duty of exercising care to make its property safe for the prosecution of the work. Denison Light & Power Co. vs. Patton, 154 Southwestern, 540.

Stock Transfer Fee.

"Our company is a stock company, incorporated under the laws of Minnesota. The stock certificates have a blank form on the back for transfer. Can we charge a fee of, say 50 cents, for the transfer of a certificate?"

Your company can, if it wishes, adopt a by-law imposing a small reasonable fee for the transfer of the certificate.

Telephone Mergers not Violation of Sherman Act.

In 1912, the Michigan State Telephone Co., the Home Telephone Co. of Detroit, the Detroit River Telephone Co., the Wayne County Telephone Co., the Macomb County Telephone Co., and the Interstate Telephone Co. made a contract which amounted to a sale to the Michigan State Telephone Co., of the property of the other companies mentioned. A petition was filed with the Michigan State Railroad Commission asking that the consolidation be permitted, and claiming the authority of act 138 of 1911 for the arrangement. A hearing was had, and the other telephone companies, including the Michigan Independent Telephone and Traffic Association, asked leave to intervene. By reason of its connection with the Traffic Association, the Home Telephone Co., of Grass Lake, was heard before the Railroad Commission and claimed to have become a party to the record.

The commission made an order ratifying the consolidation and authorizing the merger of all the companies first named. The Grass Lake company brought suit to set aside the order of the commission, claiming that the act of the legislature authorizing the merger was unconstitutional, and that the order unlawfully enlarged the scope of the act and created a legalized monopoly in certain territory of the state. The defendants in the suit to set aside the order demurred, on the ground that the act was constitutional and that the suit could not be brought by a private company, but that the attorney general should have brought it to render it effective.

The supreme court of the state upheld the demurrer on the latter ground, holding that grievances which affect the public at large must be redressed in a suit brought by the attorney general. There being no averment that any of the companies were doing or contemplating an interstate business, it was held that the bill showed on its face that there was no attempt in such consolidation to violate the Sherman anti-trust act.

The contention that the act authorizing such consolidations was unconstitutional, was based on an alleged defect in the title of the act. This was "An act to declare telephone lines and telephone companies within the state to be common carriers, to regulate the same, and prescribing a penalty for violation of the act." The contention was overruled, on the ground that the word "regulate" included not only a regulation of the rates, but a regulation of the operation of the lines and companies, which was sufficient to include consolidation.

In its decision, the court made the following significant comment: "No restraint of trade is made out, because the only effect upon the business is to increase and improve it. To that extent one corporation, when properly regulated and controlled, is preferable to a number of distinct corporations, acting independently." Home Telephone Co. vs. Michigan Railroad Commission, 140 Northwestern, 496.

TELEPHONE WIRE

We Guarantee
Greatest Efficiency
Longest Life
Most Satisfactory Service
Lowest Cost of Up-keep
In the Use of our wire.

Write for FREE SAMPLE
Make Test and Comparison

Approved by Leading Institutions of Technology and Telephonic Science. Handled by most representative Jobbers and Supply Houses.

Indiana Steel & Wire Co.
Muncie, Indiana.

COSTS CENTS SAVES DOLLARS

FRANKEL'S ELECTRIC TESTING CLIPS

U. S. Patent Nov. 15, 1904, and Foreign Countries.

TIME, MATERIAL and LABOR SAVERS

The Teeth Grip the Wire or Binding Post.
The Pin Pierces the Insulation of Wire making a Perfect Test Connection.

No. 2533 The Helpful

No. 2534 The Reliable

Brass Material
Nickel Plated

Hardened Tool Steel Pins

No. 2521 The Standard

No. 2530 The Special

No. 2535 The Efficient

No.	Less than Doz.	Doz. Lots	100 Lots	500 Lots	1000 Lots
2521	20	12½	11	10	9 cents each
2533	24	18	16	15	13 " "
2534	24	18	16	15	13 " "
2535	30	22½	20	18	17 " "
2530	10	8	7	6	5 " "

Net F. O. B. New York, from your Supply House, or

FRANKEL DISPLAY FIXTURE CO.
733-735 Broadway **New York, U. S. A.**
Patentees and Manufacturers

GET HEMINGRAY GLASS INSULATORS

For Best Transmission

The teats on the petticoat, an exclusive feature of Hemingray Insulators, prevent water running to pins and causing grounds.

Hemingray Insulators are all insulation and are unusually free from breakage.

Write for Prices

Hemingray Glass Co.
Covington, Ky.

Factories: Muncie, Ind.

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FRENCH Telephone Cells

Are Manufactured and Shipped
Direct from Madison, Wis.

There is no reason why the dry cells *you* use should get old in transportation and stock rooms before you install them.

Your orders will be shipped the day received.

Send for new price schedule.

FRENCH BATTERY & CARBON CO.
Madison, Wis.

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Classified Advertisements in "TELEPHONY" cost 5 cents per word—minimum number of words per insertion, twenty. Cash should accompany order. Advertisements in black face type, 10 cents per word. No advertisements accepted after Thursday.

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"REBUILT" TELEPHONE APPARATUS and exchange equipment saves you 30 to 50 per cent without sacrificing quality or efficiency.

SWITCHBOARDS —Telephones—Apparatus — Protection Equipment—Cable—Everything you need for the installation and operation of a complete exchange—Magneto or Central Energy—of the best and most reputable manufacturers.

SIX YEARS SUCCESSFUL OPERATION of our "Rebuilt" Equipment Department puts it past the experimental stage. Quality and price will make you a permanent customer. Better investigate.

Ask for Our Free No. 78 Bargain Bulletin

Address
"Rebuilt" Equipment Department
PREMIER ELECTRIC COMPANY
CHICAGO, ILL.
"REBUILT" when connected with PREMIER means something

UNUSED TELEPHONES FOR SALE CHEAP—All parts are guaranteed—if not satisfied return to us. Prices and literature on request. Interstate Elec. & Mfg. Co., Sioux City, Iowa.

FOR SALE—Exchange in Oklahoma oil region; 30 miles rural lines; 94 telephones; undeveloped territory. Address W. G. S., care TELEPHONY.

FOR SALE—Telephones bridging, three to four dollars each; telephones, series, one to three dollars each; Sterling terminals with cable attached 100 line go at $15 each. Everything sent out guaranteed. Phones without batteries one dollar, switchboard cable, generators, induction coils—everything telephony. Address: Telephone Sales Co., Oxford, Wis.

A PRINTOGRAPH FOR SALE; $75 takes it, with motor and type, complete. For circular letters, bills and office printing. Fine condition. Worth $250. TELEPHONY PUBLISHING CO.

Exchange

160 acres, 3½ miles from good railroad town, Carroll County, Missouri, good deep black soil that will raise as good crops as any Illinois land, only 56 miles from Kansas City. Price $125 per acre. Will take telephone exchange $8,000 to $10,000. Address Chas. Edwards, 313½ S. 5th St., Springfield, Ill.

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CROSS ARMS manufactured from sound, straight grain Douglas fir. Send us specifications and get our prices before buying. Cameron Lumber Co., Ltd., Victoria, B. C. Can.

NEXT TIME YOU NEED APPARATUS ORDER FROM US AND SAVE MONEY

All apparatus listed in our bulletin is practically new—no obsolete apparatus

BULLETIN NO. 5 SENT ON REQUEST

REBUILT TELEPHONE EQUIPMENT COMPANY
2127-2129 W. 21st Street, CHICAGO, ILL.

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WE BEG TO DIRECT YOUR ATTENTION to the Universal Wire Loop, an improvement upon the ordinary string loop for hanging up catalogues, directories, telephone books, prices current, etc. Write us for prices and samples. Wire Loop Mfg. Co., 75 Shelby St., Detroit, Mich.

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I AM A PATENT EXPERT. Consulting Engineer and Specialist in Electrical and Telephone Engineering. What is your problem? Francis W. Dunbar, Monadnock Block, Chicago, Ill.

YOUR INVENTION PERFECTED FOR MANUFACTURING by telephone experts of 15 years' experience. Free consultation. Van Deventer & Warren, Sumter, S. C., Solicitors of Patents, Telephone Engineers.

Help Wanted

WANTED AT ONCE—Experienced man for lineman and troubleman on city and country lines. Send references and state wages wanted in first letter. Address Manistique Telephone Co., Manistique, Mich.

WANTED—At once, to get in communication with a first-class telephone accountant capable of taking care of all accounts and collecting for three exchanges. Must file $2,000 bond with company. Only hustlers need apply. Address 1479, care TELEPHONY.

WANTED—Good, sober, industrious troublemen, linemen and cablemen. No others need apply. Address 1476, care of TELEPHONY.

WANTED—A telephone man to manage a telephone system of 250 telephones. Must invest a few hundred dollars. Address Telephone Sales Co., Oxford, Wis.

WANTED—Two telephone linemen wanted. Address Coon Bros., Rantoul, Ill.

WANTED—An efficient troubleman. Must have Automatic experience. Permanent position for right man. Address Tri-State Telephone Co., Clinton, Iowa.

WANTED—High quality telephone factory has opening for first-class, reliable sales correspondent. Want a REAL BUSINESS GETTER. State experience and salary. All applications strictly confidential. Address 1478, care of TELEPHONY.

Positions Wanted

WANTED—Position as manager or wire chief by married man, experienced on Common Battery, Magneto plants and handling of employes. Please state salary. Address 1477, care TELEPHONY.

Loose Leaf Binders

FOR SALE—Loose Leaf Binders for telephone records as supplied to New York Telephone Company. Tell us your requirements. Buchan Sales Co., 314-320 Market St., Newark, N. J.

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TELEPHONE PAY STATION SIGNS—Finest porcelain enamel. Practically indestructible. Retain true colors and finish. Get the ones with the reputation. Burdick Enamel Sign Co., 166 N. State St., Chicago, Ill.

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TELEPHONE SUPPLIES—Large and complete stock, prompt shipments and best discounts. Send for our catalogue Harry I. Wood Co., 514 W. Main St., Louisville, Ky.

WE ARE JOBBERS of electrical supplies. Our service and prices are unexcelled. Let us send you our catalog. Robinson-Nelson & Co., 711 E. Main St., Richmond, Va.

CONSTRUCTION SUPPLIES—Anything you need for your construction work can be ordered from us at prices that can't be beat. Doubleday-Hill Elec. Co., 721 Liberty Ave. Pittsburgh, Pa.

WE ARE JOBBERS. Get our prices on telephones, wires, pins, brackets, poles, cross arms, glass insulators—pole line hardware. Indianapolis Elec. Supply Co., Indianapolis, Ind.

Cable Testers

WET CABLE TROUBLE—If the wet spot can be located without cutting the cable the Wireless Cable Tester will do it. Sent on trial. Address, Electric Spec. Mfg. Co., 426 Granby St., Cedar Rapids, Iowa.

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If you want to add a "seller" and thereby complete your line of specialties, this proposition will interest you. Do not answer unless you mean business and are interested.

Address "ANCHOR," care Telephony Publishing Co.
CHICAGO, ILL.

"Buyers" Reference Index

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Our patent service is different

We do not attempt to suggest to inventors what to invent—neither do we buy or sell patents. But we do endeavor to give an inventor accurate information as to what his patent will cost when perfected and some idea as to the probable demand which will result for same. Our booklet tells about our service; why it is advantageous.

Any telephone man who is getting ready to have an idea patented should write for a copy of it.

H. R. Van Deventer, E. E.
R. M. Warren, M. E.

Solicitor of Patents — Telephone Experts

SUMTER, S. C.

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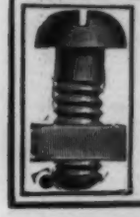
CEDAR POLES Prompt Shipments Write for Prices TORREY CEDAR CO., Cloquet, Wis.



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Of every description for telephone construction. Besides we make screws, nuts and pole line hardware. Hot or cold galvanizing. Prompt shipments. Write mentioning *TELEPHONY*.

ROCKFORD BOLT CO., 20 RUBY STREET ROCKFORD, ILL.

Schwarze extension telephone bells

with their harmonious, penetrating tone should be used by you for every extension. They demand no attention, are weatherproof and economical. Would you like to have our catalog?

It will be sent free.

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Does 32 years' experience mean anything to you? We have built some of the largest telephone exchanges now in operation. We also overhaul exchanges. Cable construction a specialty.
Will you allow us to estimate?
GEO. H. GLASS & COMPANY Pekin, Ill.

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RECOGNIZED AUTHORITIES ON PHYSICAL VALUES
APPRAISERS ENGINEERS
Public Utility Appraisal a Specialty
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B-O-O-K-K-E-E-P-I-N-G "Coffey-System"
"AUDITING" Meets requirements of all Commissions Pythian Bldg., Indianapolis Ind

Advertising *Pays* in Telephony

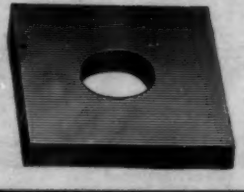
Telephony Publishing Co.,
Monadnock Bldg.,
Chicago

Gentlemen:

During all the writer's experience in advertising we have never found a single advertising medium, which has produced the direct results in bona fide inquiries that TELEPHONY has. Our January 11th front cover advertisement brought 310 inquiries.

C. L. MICHOD, Mgr
Carbo Steel Post Co.

Now Is a Good Time to Begin



M. LANZ & SONS,
PITTSBURGH, PA.
Manufacturers of
ELECTRICAL HARDWARE
Plain and Galvanized
Braces, Back and Cross Arm. Break Irons. Bolts, Arm, Eye and Thru. Cable Racks and Hooks. Guy Rods and Clamps. Hub Guards. Pole Steps and Brackets. Pole Balconies. Pothead Supports. Patented Ground Rods. Reinforcing Straps. Strain Plates, etc., etc.

You Would Be Glad To Do It

Spend $1.00 on every telephone you have and get all this—

The Good Will and confidence of your subscriber.

The Elimination of trouble from lightning.

The Assurance of uninterrupted service.

The Reduction of your maintenance account.

The Established fact that your phones are installed RIGHT, on "The Wirt Plan."

The Price of the Wirt is less than $1.00 only 75c.

Write us or your jobber.

Metallic Lightning Arrester Co.
Lewiston, Minn.

2 OPERATIONS IN 1

Your joint is both fluxed and sodered by applying

ALLEN
PRESTO SODER
STICK • PASTE

The Combination Flux and Soder

This means not only a saving in time but also a correct joint—mechanically and electrically perfect. Our experience enables us to mix the ingredients so every atom of soder is covered and soaked with flux. This does away with voids entirely—that it is right is shown by the number of satisfied telephone companies insisting on **Allen Presto Soder**—(paste or stick). Send 20 cents *and your dealer's name* for a sample of either—give it a severe trial.

L. B. ALLEN CO., Inc., 4578 N. Lincoln Street, Chicago, Ill.
Branches: New York, Winnipeg, San Francisco, Portland

THE H-C FLEXIPHONE is a flexible phone USED MOSTLY BY BUSY PEOPLE

You can push it where you will—it's never in the way.
It swings clear of all papers and there's never any tangling of cords.

THE HOLTZER-CABOT ELECTRIC COMPANY
Brookline, Mass. and Chicago, Ill.

TURNER

TURNER
TORCHES
TURNER
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CONVENIENT
HOTTEST
ECONOMICAL
SAFEST

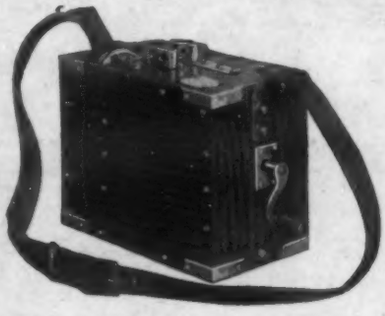
Trade Names:
Hot Blast
Old Reliable
Double Jet
Torches

No. 222—$3.50 Each Net

AT ALL JOBBERS AT FACTORY PRICES

The Turner Brass Works
SYCAMORE, ILL., U. S. A.

Every Pole is a Test Pole When You Have a Stewart Test Set



Tells which way and how far trouble is from tester without cutting a wire. Sent on trial.

Ask Your jobber or write us.

Stewart Bros. **Ottawa, Ill.**

Note Protection at Corners

×3

×6

Blake Insulated Staples

Unequalled for telephone and bell wiring. The fibre insulation prevents troublesome short circuits and grounds.

5 Sizes Pat. Nov., 1900

Write for Samples

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ABSOLUTE LIGHTNING PROTECTION

With Our No. 1 Patent Wrapped Fuse

All Forms of Protectors for Telephones, Switchboards and Cables

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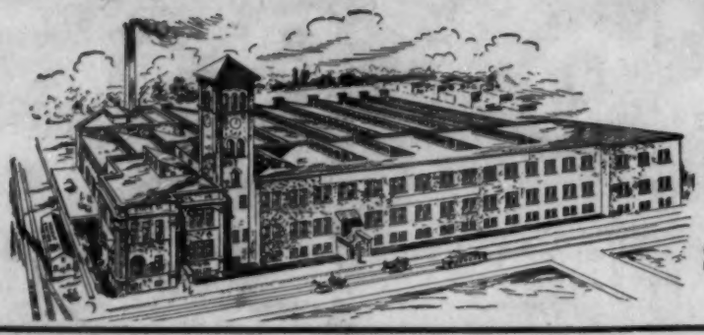

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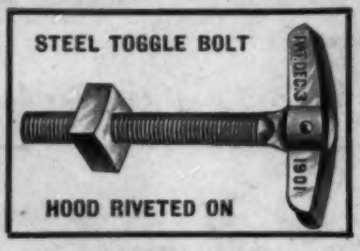

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